Summary of Revised Materials

Colon Mine Site - Application for Mine Permit Transfer/Modification

Addendum 1 - March 13, 2015

Section / Item	Action Needed	Comments
Binder		
Cover	replace	added revision date
Spine	replace	added revision date
Calculation B - Stormwater		
Sediment Basin Calculations	replace entire section	Revisions to Sediment Basins 3, 4, 6, 8, and 9 for 25-year 24-hour storm
Drawings		
01C-11 01C-12	replace select drawings	Revisions to Erosion & Sediment Control Plan for 25-year 24-hour storm

Mine Permit Transfer/Modification

Colon Mine Site

Charah, Inc.

Sanford, North Carolina

November 2014
Revised December 2014
Revised March 2015

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #1	Sheet: 1	Of: 4

Objective Design the sediment basin to contain the 10-year storm and pass the 100-year storm without over topping the berm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. VA Erosion and Sediment Control Handbook
3. NOAA Atlas 14, Volume 2, Version 3

Given

Phase	1	2	2	2		
Storm Event (yrs) =	10	10	25	100		
Total Drainage Area A (ac) =	5.4	9.3	9.3	9.3		
Disturbed Area (ac) =	5.4	9.3	9.3	9.3		
Curve Number CN =	86	86	86	86	Hydrographs	
Rainfall Depth P (in) =	5.28	5.28	6.28	7.88	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	32.86	43.09	53.49	70.07	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	16,740	cf (based on largest Phase)
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	18,744	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
283	0	0	-	-	-
283	0	13,792	0	0	0
284	1	15,414	14,595	14,595	541
285	2	17,133	16,266	30,861	1,143
286	3	18,947	18,032	48,894	1,811
287	4	21,463	20,192	69,086	2,559
288	5	23,731	22,588	91,673	3,395
289	6	26,305	25,007	116,680	4,321

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 48,894 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 18,947 *Required Surface Area Achieved*

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
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Task:	Sediment Basin #1	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	48,894		
Number of Skimmers	1		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	9,779		0.11 cfs
Selected Skimmer Size (inches) =	4		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	2.7		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	2	2	2
Storm Event (yrs) =	10	10	25	100
S =	1.63	1.63	1.63	1.63
Runoff Depth Q* (inches) =	3.73	3.73	4.68	6.22
Time to Peak T_p (min) =	26.67	35.03	35.39	35.90

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	48,894
Z_2 (ft) =	6	S_2 (cf) =	116,680

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.3 Ref 2, III-8

$K_S = S_2/Z_2^{\,b}$ = 12,318

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
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Task:	Sediment Basin #1	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor =	3.281	ft/sec per m/sec	
Gravitational Acceleration, g (m/s^2) =	9.81		
Specific Gravity of soil (s_s)=	2.6		
Kinematic Viscosity of water (v) =	1.14E-06	n^2 / sec @ 20° C	Ref 2, IV-11
Diameter of the Design Particle d_{15} =	40.00E-06	m	

Design Particle Settling Velocity = (g / 18) * [(s_s - 1) / v] d^2 = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 7.00
Set Top of Dam at (ft) = 7.50

See Hydrograph

Emergency Spillway

Q_E (cfs) = 100-Yr Storm
Q_E (cfs) = 5.8

Cross Section =	Trapezoid		
Channel Side Slope (z) =	5	(enter X for X:1)	
n =	0.03	Grass Lined	
Vp (ft/sec) =	5.0	Permissible Velocity for lining	Ref 2, II-7
Allowable Shear Stress (psf) =	2.0	Allowable Shear Stress for lining	
Bottom Width, b (ft) =	20		

Calculate Required Depth of Spillway:

Normal-Depth Procedure

$AR^{2/3}=Qn/1.49s^{0.5}$ Q=VA

$Z_{req}=Qn/1.49s^{0.5}$ Area (A)= bd+z(d^2)

$Z_{av}=AR^{2/3}$ R=Area/(b+2d((z^2)+1)^.5)

Avg Shear Stress(T) = K_b*d*s*unit weight of water

Channel Slope ft/ft	Depth, d (ft)	A (sf)	Z_{req}	R	Z_{avail}	V (ft/sec)	T (psf)
0.01	0.18	3.77	1.17	0.17	1.17	1.5	0.1
0.02	0.15	3.03	0.82	0.14	0.82	1.9	0.2

Construct the channel to be :	20	ft, Bottom Width (measured at top of lining)
	0.5	ft, depth (measured at top of lining)
	1%	slope

Anti-Seep Collar:

Anti-Seep Collar Size =	2 * Barrel Dia	
Anti-Seep Collar Size (ft) =	3	
Use Anti-Seep Collar Size (ft) =	3	x 3

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #1	Sheet: 4	Of: 4

Minimum Concrete Base for Riser:

Diameter of Riser (in) =	54	From Hydrograph
Avg Density of Concrete (lbs/cf) =	87.6	
Density of Water (lbs/cf) =	62.4	
Riser Displacement (cf) =	101.79	Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy =	27^{-1}	
Min Concrete Needed (cy) =	2.69	
Width & Length (ft) =	5.5	
Thickness (ft) =	2.4	

Anti-Vortex Device:

Diameter of Riser (in) =	54	From Hydrograph
Cylinder Diameter (in) =	78	Ref 3, III-104, Table 3.14-D
Cylinder Thickness (gage) =	16	
Cylinder Height (in) =	25	

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	9	6 * Barrel Diameter
Q_B (cfs) =	10.0	Peak Flow out of the barrel 25-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
10.0	3.26	0.51	5.9	0.41	3.26	1.7

Flow Depth = Tailwater, d (ft) = 0.51 0.5* Barrel Diameter (ft) = 0.75 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
1.5	4.5	10	12	0.3	Class A

Conclusion

The basin can contain the 10-yr storm and pass the 100-yr storm without overtopping the berm.

HDR Computation

Job No. 06985-10570-018

Project:	Charah Colon Mine	Computed: PAW	Date: 12/31/14
Subject:	Permit Application	Checked: EAW	Date: 1/2/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	54	
Circumference of Riser (in) =	169.6	
eight of Riser from bottom of barrel (in) =	77	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	1	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.11	0.11
0.39	0.00	0.00	0.00			0.11	0.11
0.44	0.00	0.00	0.00			0.11	0.11
0.49	0.00	0.00	0.00			0.11	0.11
0.54	0.00	0.00	0.00			0.11	0.11
0.59	0.00	0.00	0.00			0.11	0.11
0.64	0.00	0.00	0.00			0.11	0.11
0.69	0.00	0.00	0.00			0.11	0.11
0.74	0.00	0.00	0.00			0.11	0.11
0.79	0.00	0.00	0.00			0.11	0.11
0.84	0.00	0.00	0.00			0.11	0.11
0.89	0.00	0.00	0.00			0.11	0.11
0.94	0.00	0.00	0.00			0.11	0.11
0.99	0.00	0.00	0.00			0.11	0.11
1.04	0.00	0.00	0.00			0.11	0.11
1.09	0.00	0.00	0.00			0.11	0.11
1.14	0.00	0.00	0.00			0.11	0.11
1.19	0.00	0.00	0.00			0.11	0.11
1.24	0.00	0.00	0.00			0.11	0.11
1.29	0.00	0.00	0.00			0.11	0.11
1.34	0.00	0.00	0.00			0.11	0.11
1.39	0.00	0.00	0.00			0.11	0.11
1.44	0.00	0.00	0.00			0.11	0.11
1.49	0.00	0.00	0.00			0.11	0.11
1.54	0.00	0.00	0.00			0.11	0.11
1.59	0.00	0.00	0.00			0.11	0.11

1.64	0.00	0.00	0.00	0.11	0.11
1.69	0.00	0.00	0.00	0.11	0.11
1.74	0.00	0.00	0.00	0.11	0.11
1.79	0.00	0.00	0.00	0.11	0.11
1.84	0.00	0.00	0.00	0.11	0.11
1.89	0.00	0.00	0.00	0.11	0.11
1.94	0.00	0.00	0.00	0.11	0.11
1.99	0.00	0.00	0.00	0.11	0.11
2.04	0.00	0.00	0.00	0.11	0.11
2.09	0.00	0.00	0.00	0.11	0.11
2.14	0.00	0.00	0.00	0.11	0.11
2.19	0.00	0.00	0.00	0.11	0.11
2.24	0.00	0.00	0.00	0.11	0.11
2.29	0.00	0.00	0.00	0.11	0.11
2.34	0.00	0.00	0.00	0.11	0.11
2.39	0.00	0.00	0.00	0.11	0.11
2.44	0.00	0.00	0.00	0.11	0.11
2.49	0.00	0.00	0.00	0.11	0.11
2.54	0.00	0.00	0.00	0.11	0.11
2.59	0.00	0.00	0.00	0.11	0.11
2.64	0.00	0.00	0.00	0.11	0.11
2.69	0.00	0.00	0.00	0.11	0.11
2.74	0.00	0.00	0.00	0.11	0.11
2.79	0.00	0.00	0.00	0.11	0.11
2.84	0.00	0.00	0.00	0.11	0.11
2.89	0.00	0.00	0.00	0.11	0.11
2.94	0.00	0.00	0.00	0.11	0.11
2.99	0.00	0.00	0.00	0.11	0.11
3.04	0.00	0.00	0.00	0.11	0.11
3.09	0.00	0.00	0.00	0.11	0.11
3.14	0.00	0.00	0.00	0.11	0.11
3.19	0.00	0.00	0.00	0.11	0.11
3.24	0.00	0.00	0.00	0.11	0.11
3.29	0.00	0.00	0.00	0.11	0.11
3.34	0.00	0.00	0.00	0.11	0.11
3.39	0.00	0.00	0.00	0.11	0.11
3.44	0.00	0.00	0.00	0.11	0.11
3.49	0.00	0.00	0.00	0.11	0.11
3.54	0.00	0.00	0.00	0.11	0.11
3.59	0.00	0.00	0.00	0.11	0.11
3.64	0.00	0.00	0.00	0.11	0.11
3.69	0.00	0.00	0.00	0.11	0.11
3.74	0.00	0.00	0.00	0.11	0.11
3.79	0.00	0.00	0.00	0.11	0.11
3.84	0.00	0.00	0.00	0.11	0.11
3.89	0.00	0.00	0.00	0.11	0.11
3.94	0.00	0.00	0.00	0.11	0.11
3.99	0.00	0.00	0.00	0.11	0.11

Sediment Basin # 1 Colon

Phase 1

10 - year Storm Event

Qp =	32.86	cfs
Tp =	26.67	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.3

K_s = 12,318

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	18	(in)	
Height of Riser above barrel =	4.9	(ft)	
Height of Riser from bottom of barrel=	6.4	(ft) elevation	289.40
Emergency Spillway =	7.0	(ft) elevation	290.00
Total Height of Dam =	7.5	(ft) elevation	290.50
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	54	(in)	
Permanent Pond Stage =	0	(ft) elevation	283.0

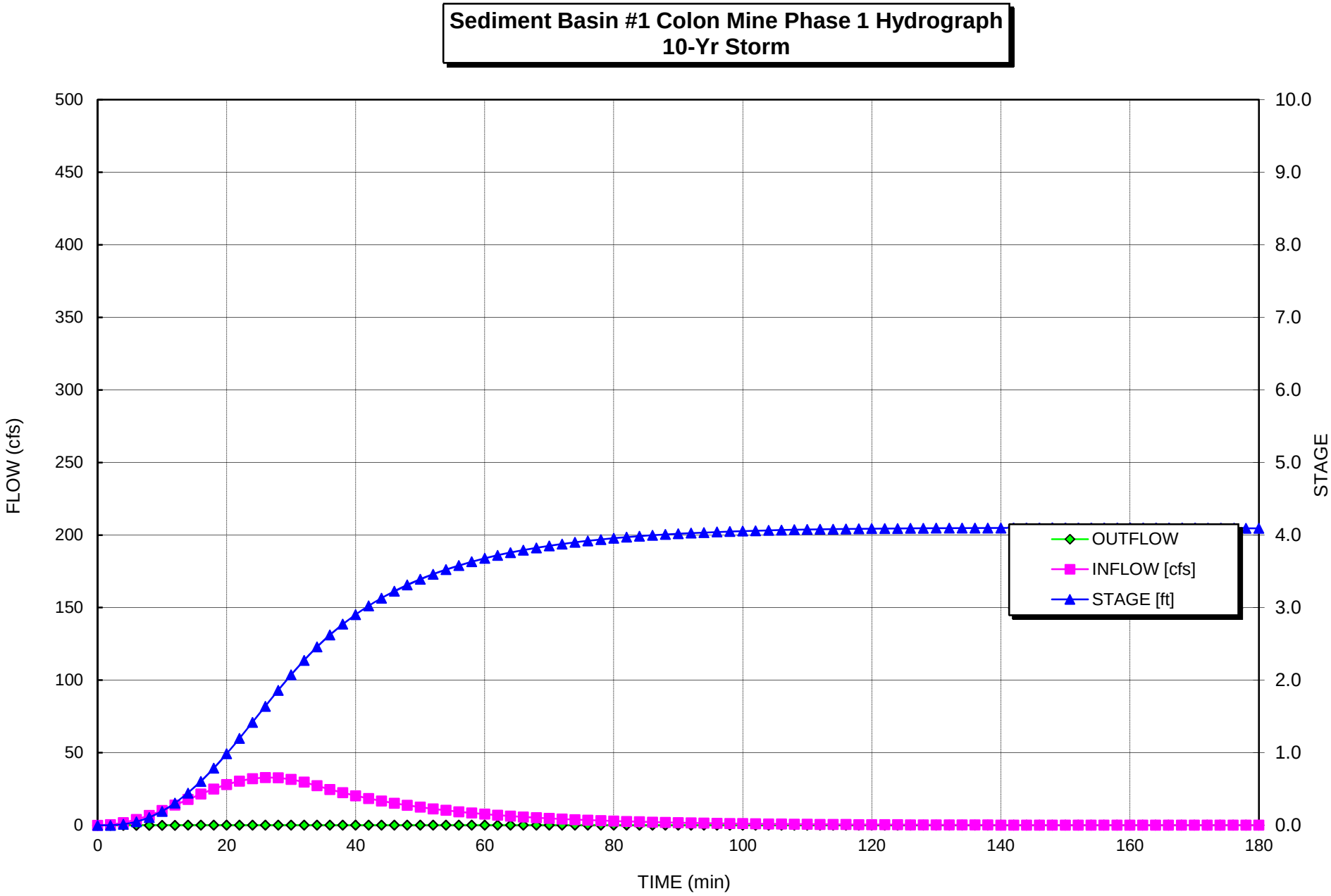
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
4.1	ft Maximum Stage	287.10	msl elevation
0.1	cfs Peak outflow		
0.1	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.5	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	1.8	54	0.0	0.00	0.00	0.00	0.00	0.00	11.31	5,140	N/A
6	3.9	269	0.0	0.00	0.00	0.00	0.00	0.00	15.64	7,111	N/A
8	6.8	741	0.1	0.00	0.00	0.00	0.00	0.00	19.22	8,735	N/A
10	10.1	1,554	0.2	0.00	0.00	0.00	0.00	0.00	22.33	10,151	N/A
12	13.9	2,770	0.3	0.00	0.00	0.00	0.00	0.00	25.12	11,416	N/A
14	17.7	4,433	0.4	0.11	0.11	0.00	0.11	0.11	27.63	12,560	100%
16	21.5	6,545	0.6	0.11	0.11	0.00	0.11	0.11	29.91	13,594	100%
18	25.0	9,111	0.8	0.11	0.11	0.00	0.11	0.11	31.99	14,539	100%
20	28.0	12,099	1.0	0.11	0.11	0.00	0.11	0.11	33.88	15,401	100%
22	30.4	15,450	1.2	0.11	0.11	0.00	0.11	0.11	35.61	16,185	100%
24	32.1	19,088	1.4	0.11	0.11	0.00	0.11	0.11	37.17	16,895	100%
26	32.8	22,921	1.6	0.11	0.11	0.00	0.11	0.11	38.58	17,535	100%
28	32.7	26,844	1.9	0.11	0.11	0.00	0.11	0.11	39.83	18,107	100%
30	31.6	30,750	2.1	0.11	0.11	0.00	0.11	0.11	40.95	18,613	100%
32	29.7	34,530	2.3	0.11	0.11	0.00	0.11	0.11	41.92	19,056	100%
34	27.2	38,084	2.5	0.11	0.11	0.00	0.11	0.11	42.77	19,439	100%
36	24.7	41,334	2.6	0.11	0.11	0.00	0.11	0.11	43.48	19,765	100%
38	22.4	44,281	2.8	0.11	0.11	0.00	0.11	0.11	44.10	20,044	100%
40	20.3	46,953	2.9	0.11	0.11	0.00	0.11	0.11	44.62	20,284	100%
42	18.4	49,375	3.0	0.11	0.11	0.00	0.11	0.11	45.08	20,492	100%
44	16.7	51,571	3.1	0.11	0.11	0.00	0.11	0.11	45.48	20,674	100%
46	15.2	53,562	3.2	0.11	0.11	0.00	0.11	0.11	45.83	20,834	100%
48	13.7	55,367	3.3	0.11	0.11	0.00	0.11	0.11	46.14	20,974	100%
50	12.5	57,003	3.4	0.11	0.11	0.00	0.11	0.11	46.42	21,099	100%
52	11.3	58,485	3.5	0.11	0.11	0.00	0.11	0.11	46.66	21,209	100%
54	10.3	59,829	3.5	0.11	0.11	0.00	0.11	0.11	46.88	21,307	100%
56	9.3	61,047	3.6	0.11	0.11	0.00	0.11	0.11	47.07	21,394	100%
58	8.4	62,150	3.6	0.11	0.11	0.00	0.11	0.11	47.24	21,472	100%
60	7.7	63,149	3.7	0.11	0.11	0.00	0.11	0.11	47.39	21,542	100%
62	6.9	64,055	3.7	0.11	0.11	0.00	0.11	0.11	47.53	21,604	100%
64	6.3	64,875	3.8	0.11	0.11	0.00	0.11	0.11	47.65	21,660	100%
66	5.7	65,618	3.8	0.11	0.11	0.00	0.11	0.11	47.76	21,710	100%
68	5.2	66,290	3.8	0.11	0.11	0.00	0.11	0.11	47.86	21,755	100%
70	4.7	66,899	3.9	0.11	0.11	0.00	0.11	0.11	47.95	21,796	100%
72	4.3	67,450	3.9	0.11	0.11	0.00	0.11	0.11	48.03	21,832	100%
74	3.9	67,948	3.9	0.11	0.11	0.00	0.11	0.11	48.10	21,865	100%
76	3.5	68,399	3.9	0.11	0.11	0.00	0.11	0.11	48.17	21,894	100%
78	3.2	68,807	3.9	0.11	0.11	0.00	0.11	0.11	48.23	21,921	100%
80	2.9	69,176	4.0	0.11	0.11	0.00	0.11	0.11	48.28	21,944	100%
82	2.6	69,509	4.0	0.11	0.11	0.00	0.11	0.11	48.32	21,966	100%

84	2.4	69,810	4.0	0.11	0.11	0.00	0.11	0.11	48.37	21,985	100%
86	2.2	70,081	4.0	0.11	0.11	0.00	0.11	0.11	48.41	22,002	100%
88	2.0	70,327	4.0	0.11	0.11	0.00	0.11	0.11	48.44	22,018	100%
90	1.8	70,548	4.0	0.11	0.11	0.00	0.11	0.11	48.47	22,032	100%
92	1.6	70,747	4.0	0.11	0.11	0.00	0.11	0.11	48.50	22,045	100%
94	1.5	70,927	4.0	0.11	0.11	0.00	0.11	0.11	48.52	22,056	100%
96	1.3	71,088	4.0	0.11	0.11	0.00	0.11	0.11	48.55	22,066	100%
98	1.2	71,234	4.0	0.11	0.11	0.00	0.11	0.11	48.57	22,075	100%
100	1.1	71,364	4.1	0.11	0.11	0.00	0.11	0.11	48.58	22,084	100%
102	1.0	71,482	4.1	0.11	0.11	0.00	0.11	0.11	48.60	22,091	100%
104	0.9	71,587	4.1	0.11	0.11	0.00	0.11	0.11	48.61	22,098	100%
106	0.8	71,681	4.1	0.11	0.11	0.00	0.11	0.11	48.63	22,104	100%
108	0.7	71,765	4.1	0.11	0.11	0.00	0.11	0.11	48.64	22,109	100%
110	0.7	71,840	4.1	0.11	0.11	0.00	0.11	0.11	48.65	22,113	100%
112	0.6	71,907	4.1	0.11	0.11	0.00	0.11	0.11	48.66	22,118	100%
114	0.6	71,966	4.1	0.11	0.11	0.00	0.11	0.11	48.67	22,121	100%
116	0.5	72,019	4.1	0.11	0.11	0.00	0.11	0.11	48.67	22,125	100%
118	0.5	72,065	4.1	0.11	0.11	0.00	0.11	0.11	48.68	22,128	100%
120	0.4	72,106	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,130	100%
122	0.4	72,142	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,132	100%
124	0.3	72,173	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,134	100%
126	0.3	72,200	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,136	100%
128	0.3	72,223	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,137	100%
130	0.3	72,243	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,139	100%
132	0.2	72,260	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,140	100%
134	0.2	72,274	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,141	100%
136	0.2	72,285	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,141	100%
138	0.2	72,294	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,142	100%
140	0.2	72,301	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,142	100%
142	0.1	72,306	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,143	100%
144	0.1	72,309	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,143	100%
146	0.1	72,311	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,143	100%
148	0.1	72,311	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,143	100%
150	0.1	72,310	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,143	100%
152	0.1	72,308	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,143	100%
154	0.1	72,305	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,142	100%
156	0.1	72,301	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,142	100%
158	0.1	72,296	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,142	100%
160	0.1	72,290	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,142	100%
162	0.1	72,283	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,141	100%
164	0.0	72,276	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,141	100%
166	0.0	72,268	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,140	100%
168	0.0	72,260	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,140	100%
170	0.0	72,251	4.1	0.11	0.11	0.00	0.11	0.11	48.71	22,139	100%
172	0.0	72,242	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,139	100%
174	0.0	72,232	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,138	100%
176	0.0	72,222	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,137	100%
178	0.0	72,212	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,137	100%
180	0.0	72,201	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,136	100%
182	0.0	72,190	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,135	100%
184	0.0	72,179	4.1	0.11	0.11	0.00	0.11	0.11	48.70	22,135	100%
186	0.0	72,168	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,134	100%
188	0.0	72,156	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,133	100%
190	0.0	72,144	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,132	100%
192	0.0	72,132	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,132	100%
194	0.0	72,120	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,131	100%
196	0.0	72,108	4.1	0.11	0.11	0.00	0.11	0.11	48.69	22,130	100%
198	0.0	72,096	4.1	0.11	0.11	0.00	0.11	0.11	48.68	22,129	100%
200	0.0	72,083	4.1	0.11	0.11	0.00	0.11	0.11	48.68	22,129	100%
202	0.0	72,071	4.1	0.11	0.11	0.00	0.11	0.11	48.68	22,128	100%
204	0.0	72,058	4.1	0.11	0.11	0.00	0.11	0.11	48.68	22,127	100%
206	0.0	72,045	4.1	0.11	0.11	0.00	0.11	0.11	48.68	22,126	100%


Sediment Basin #1 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

Qp = 43.09 cfs

Tp = 35.03 minutes

dT = Max of **2** minutes

or **1.0%** of increment to peak

Sediment Basin # 1 Colon

Phase 2

10 - year Storm Event

b = 1.3

Ks = 12,318

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	18	(in)	
Height of Riser above barrel =	4.9	(ft)	
Height of Riser from bottom of barrel=	6.4	(ft) elevation	289.40
Emergency Spillway =	7	(ft) elevation	290.00
Total Height of Dam =	7.5	(ft) elevation	290.50
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	54	(in)	
Permanent Pond Stage =	0	(ft) elevation	283.0

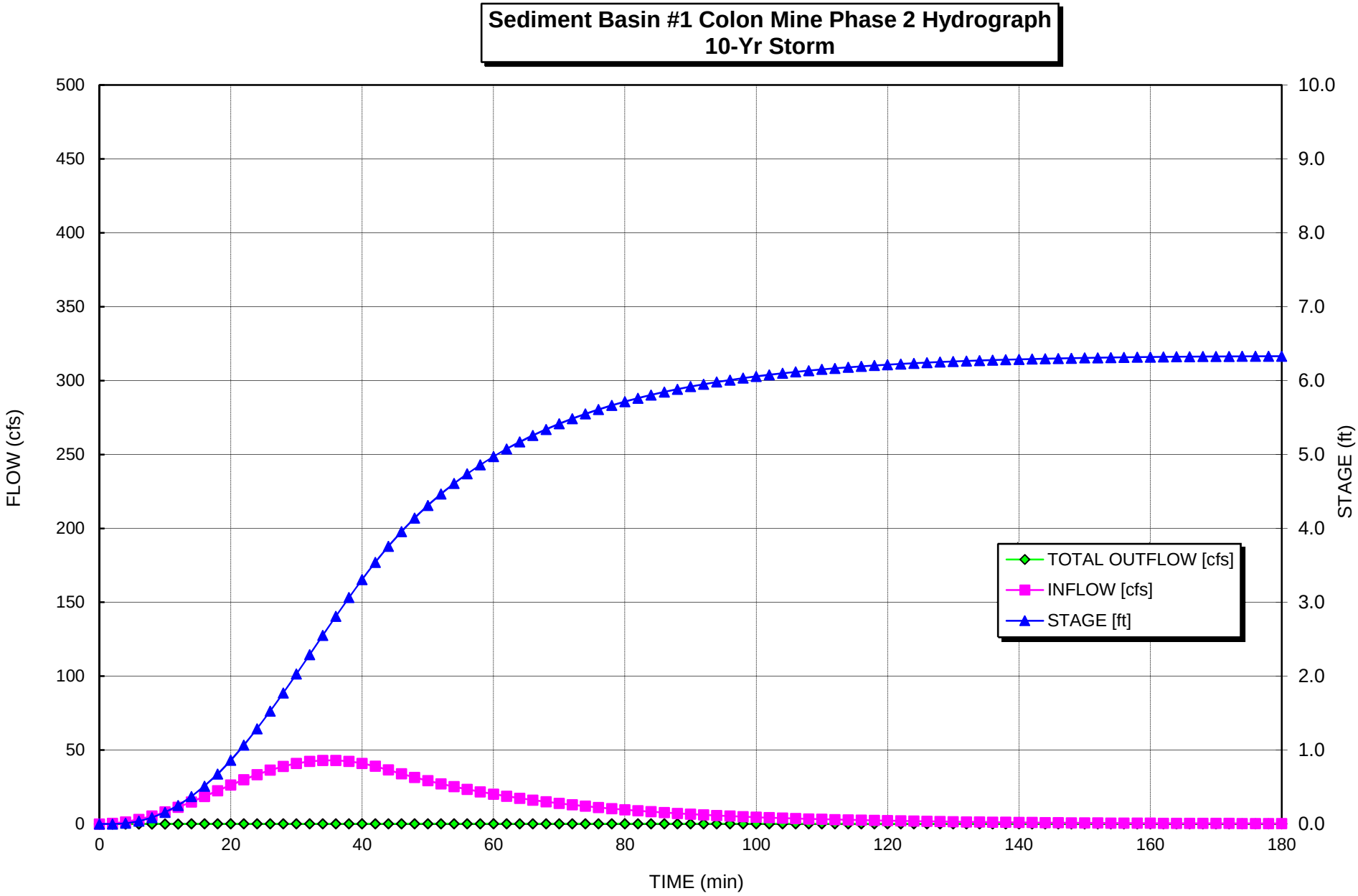
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
6.3	ft Maximum Stage	289.33	msl elevation
0.1	cfs Peak outflow		
0.1	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	1.4	41	0.0	0.00	0.00	0.00	0.00	0.00	10.70	4,864	N/A
6	3.0	206	0.0	0.00	0.00	0.00	0.00	0.00	14.82	6,735	N/A
8	5.3	571	0.1	0.00	0.00	0.00	0.00	0.00	18.23	8,285	N/A
10	8.1	1,209	0.2	0.00	0.00	0.00	0.00	0.00	21.22	9,647	N/A
12	11.3	2,181	0.3	0.00	0.00	0.00	0.00	0.00	23.92	10,875	N/A
14	14.9	3,539	0.4	0.11	0.11	0.00	0.11	0.11	26.40	11,998	100%
16	18.6	5,309	0.5	0.11	0.11	0.00	0.11	0.11	28.66	13,029	100%
18	22.5	7,530	0.7	0.11	0.11	0.00	0.11	0.11	30.77	13,987	100%
20	26.3	10,214	0.9	0.11	0.11	0.00	0.11	0.11	32.74	14,880	100%
22	30.0	13,358	1.1	0.11	0.11	0.00	0.11	0.11	34.57	15,714	100%
24	33.4	16,941	1.3	0.11	0.11	0.00	0.11	0.11	36.28	16,491	100%
26	36.4	20,933	1.5	0.11	0.11	0.00	0.11	0.11	37.87	17,215	100%
28	38.9	25,288	1.8	0.11	0.11	0.00	0.11	0.11	39.35	17,888	100%
30	40.9	29,948	2.0	0.11	0.11	0.00	0.11	0.11	40.73	18,513	100%
32	42.3	34,846	2.3	0.11	0.11	0.00	0.11	0.11	42.00	19,092	100%
34	43.0	39,909	2.6	0.11	0.11	0.00	0.11	0.11	43.18	19,625	100%
36	43.0	45,055	2.8	0.11	0.11	0.00	0.11	0.11	44.25	20,114	100%
38	42.3	50,202	3.1	0.11	0.11	0.00	0.11	0.11	45.23	20,561	100%
40	41.0	55,268	3.3	0.11	0.11	0.00	0.11	0.11	46.13	20,967	100%
42	39.0	60,173	3.5	0.11	0.11	0.00	0.11	0.11	46.93	21,332	100%
44	36.5	64,842	3.8	0.11	0.11	0.00	0.11	0.11	47.65	21,658	100%
46	33.9	69,213	4.0	0.11	0.11	0.00	0.11	0.11	48.28	21,947	100%
48	31.5	73,270	4.1	0.11	0.11	0.00	0.11	0.11	48.84	22,202	100%
50	29.2	77,036	4.3	0.11	0.11	0.00	0.11	0.11	49.34	22,429	100%
52	27.2	80,532	4.5	0.11	0.11	0.00	0.11	0.11	49.79	22,632	100%
54	25.2	83,776	4.6	0.11	0.11	0.00	0.11	0.11	50.19	22,815	100%
56	23.4	86,788	4.7	0.11	0.11	0.00	0.11	0.11	50.55	22,979	100%
58	21.7	89,583	4.9	0.11	0.11	0.00	0.11	0.11	50.88	23,127	100%
60	20.2	92,177	5.0	0.11	0.11	0.00	0.11	0.11	51.18	23,262	100%
62	18.7	94,585	5.1	0.11	0.11	0.00	0.11	0.11	51.44	23,384	100%
64	17.4	96,819	5.2	0.11	0.11	0.00	0.11	0.11	51.69	23,495	100%
66	16.1	98,893	5.3	0.11	0.11	0.00	0.11	0.11	51.91	23,596	100%
68	15.0	100,818	5.3	0.11	0.11	0.00	0.11	0.11	52.12	23,689	100%
70	13.9	102,603	5.4	0.11	0.11	0.00	0.11	0.11	52.30	23,774	100%
72	12.9	104,260	5.5	0.11	0.11	0.00	0.11	0.11	52.47	23,851	100%
74	12.0	105,798	5.5	0.11	0.11	0.00	0.11	0.11	52.63	23,922	100%
76	11.1	107,225	5.6	0.11	0.11	0.00	0.11	0.11	52.77	23,987	100%
78	10.3	108,548	5.7	0.11	0.11	0.00	0.11	0.11	52.90	24,047	100%
80	9.6	109,776	5.7	0.11	0.11	0.00	0.11	0.11	53.02	24,102	100%
82	8.9	110,915	5.8	0.11	0.11	0.00	0.11	0.11	53.14	24,153	100%
84	8.3	111,972	5.8	0.11	0.11	0.00	0.11	0.11	53.24	24,199	100%

86	7.7	112,952	5.8	0.11	0.11	0.00	0.11	0.11	53.33	24,242	100%
88	7.1	113,861	5.9	0.11	0.11	0.00	0.11	0.11	53.42	24,282	100%
90	6.6	114,704	5.9	0.11	0.11	0.00	0.11	0.11	53.50	24,318	100%
92	6.2	115,486	6.0	0.11	0.11	0.00	0.11	0.11	53.57	24,351	100%
94	5.7	116,211	6.0	0.11	0.11	0.00	0.11	0.11	53.64	24,382	100%
96	5.3	116,883	6.0	0.11	0.11	0.00	0.11	0.11	53.70	24,411	100%
98	4.9	117,506	6.0	0.11	0.11	0.00	0.11	0.11	53.76	24,437	100%
100	4.6	118,083	6.1	0.11	0.11	0.00	0.11	0.11	53.82	24,462	100%
102	4.2	118,618	6.1	0.11	0.11	0.00	0.11	0.11	53.87	24,484	100%
104	3.9	119,114	6.1	0.11	0.11	0.00	0.11	0.11	53.91	24,505	100%
106	3.7	119,574	6.1	0.11	0.11	0.00	0.11	0.11	53.95	24,524	100%
108	3.4	119,999	6.1	0.11	0.11	0.00	0.11	0.11	53.99	24,542	100%
110	3.2	120,394	6.2	0.11	0.11	0.00	0.11	0.11	54.03	24,558	100%
112	2.9	120,759	6.2	0.11	0.11	0.00	0.11	0.11	54.06	24,573	100%
114	2.7	121,097	6.2	0.11	0.11	0.00	0.11	0.11	54.09	24,587	100%
116	2.5	121,409	6.2	0.11	0.11	0.00	0.11	0.11	54.12	24,600	100%
118	2.3	121,699	6.2	0.11	0.11	0.00	0.11	0.11	54.15	24,612	100%
120	2.2	121,967	6.2	0.11	0.11	0.00	0.11	0.11	54.17	24,623	100%
122	2.0	122,214	6.2	0.11	0.11	0.00	0.11	0.11	54.19	24,633	100%
124	1.9	122,443	6.2	0.11	0.11	0.00	0.11	0.11	54.21	24,643	100%
126	1.7	122,655	6.2	0.11	0.11	0.00	0.11	0.11	54.23	24,651	100%
128	1.6	122,850	6.3	0.11	0.11	0.00	0.11	0.11	54.25	24,659	100%
130	1.5	123,031	6.3	0.11	0.11	0.00	0.11	0.11	54.27	24,666	100%
132	1.4	123,198	6.3	0.11	0.11	0.00	0.11	0.11	54.28	24,673	100%
134	1.3	123,351	6.3	0.11	0.11	0.00	0.11	0.11	54.29	24,680	100%
136	1.2	123,493	6.3	0.11	0.11	0.00	0.11	0.11	54.31	24,685	100%
138	1.1	123,624	6.3	0.11	0.11	0.00	0.11	0.11	54.32	24,691	100%
140	1.0	123,744	6.3	0.11	0.11	0.00	0.11	0.11	54.33	24,695	100%
142	1.0	123,855	6.3	0.11	0.11	0.00	0.11	0.11	54.34	24,700	100%
144	0.9	123,957	6.3	0.11	0.11	0.00	0.11	0.11	54.35	24,704	100%
146	0.8	124,051	6.3	0.11	0.11	0.00	0.11	0.11	54.36	24,708	100%
148	0.8	124,137	6.3	0.11	0.11	0.00	0.11	0.11	54.36	24,711	100%
150	0.7	124,215	6.3	0.11	0.11	0.00	0.11	0.11	54.37	24,715	100%
152	0.7	124,288	6.3	0.11	0.11	0.00	0.11	0.11	54.38	24,717	100%
154	0.6	124,354	6.3	0.11	0.11	0.00	0.11	0.11	54.38	24,720	100%
156	0.6	124,414	6.3	0.11	0.11	0.00	0.11	0.11	54.39	24,723	100%
158	0.5	124,469	6.3	0.11	0.11	0.00	0.11	0.11	54.39	24,725	100%
160	0.5	124,519	6.3	0.11	0.11	0.00	0.11	0.11	54.40	24,727	100%
162	0.5	124,565	6.3	0.11	0.11	0.00	0.11	0.11	54.40	24,729	100%
164	0.4	124,606	6.3	0.11	0.11	0.00	0.11	0.11	54.41	24,730	100%
166	0.4	124,644	6.3	0.11	0.11	0.00	0.11	0.11	54.41	24,732	100%
168	0.4	124,678	6.3	0.11	0.11	0.00	0.11	0.11	54.41	24,733	100%
170	0.3	124,708	6.3	0.11	0.11	0.00	0.11	0.11	54.42	24,734	100%
172	0.3	124,735	6.3	0.11	0.11	0.00	0.11	0.11	54.42	24,736	100%
174	0.3	124,760	6.3	0.11	0.11	0.00	0.11	0.11	54.42	24,736	100%
176	0.3	124,781	6.3	0.11	0.11	0.00	0.11	0.11	54.42	24,737	100%
178	0.3	124,801	6.3	0.11	0.11	0.00	0.11	0.11	54.42	24,738	100%
180	0.2	124,817	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,739	100%
182	0.2	124,832	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,739	100%
184	0.2	124,844	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,740	100%
186	0.2	124,855	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,740	100%
188	0.2	124,864	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,741	100%
190	0.2	124,872	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,741	100%
192	0.2	124,877	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,741	100%
194	0.1	124,882	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,741	100%
196	0.1	124,885	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,742	100%
198	0.1	124,887	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,742	100%
200	0.1	124,888	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,742	100%
202	0.1	124,888	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,742	100%
204	0.1	124,887	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,742	100%


Sediment Basin #1 Colon Mine Phase 2 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE (ft)
TIME (min)
TOTAL OUTFLOW [cfs]
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Sediment Basin # 1 Colon

Phase 2

25 - year Storm Event

Qp =	53.49	cfs
Tp =	35.39	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.3

Ks = 12,318

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	18	(in)	
Height of Riser above barrel =	4.9	(ft)	
Height of Riser from bottom of barrel=	6.4	(ft) elevation	289.40
Emergency Spillway =	7.0	(ft) elevation	290.00
Total Height of Dam =	7.5	(ft) elevation	290.50
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	54	(in)	
Permanent Pond Stage =	0	(ft) elevation	283.0

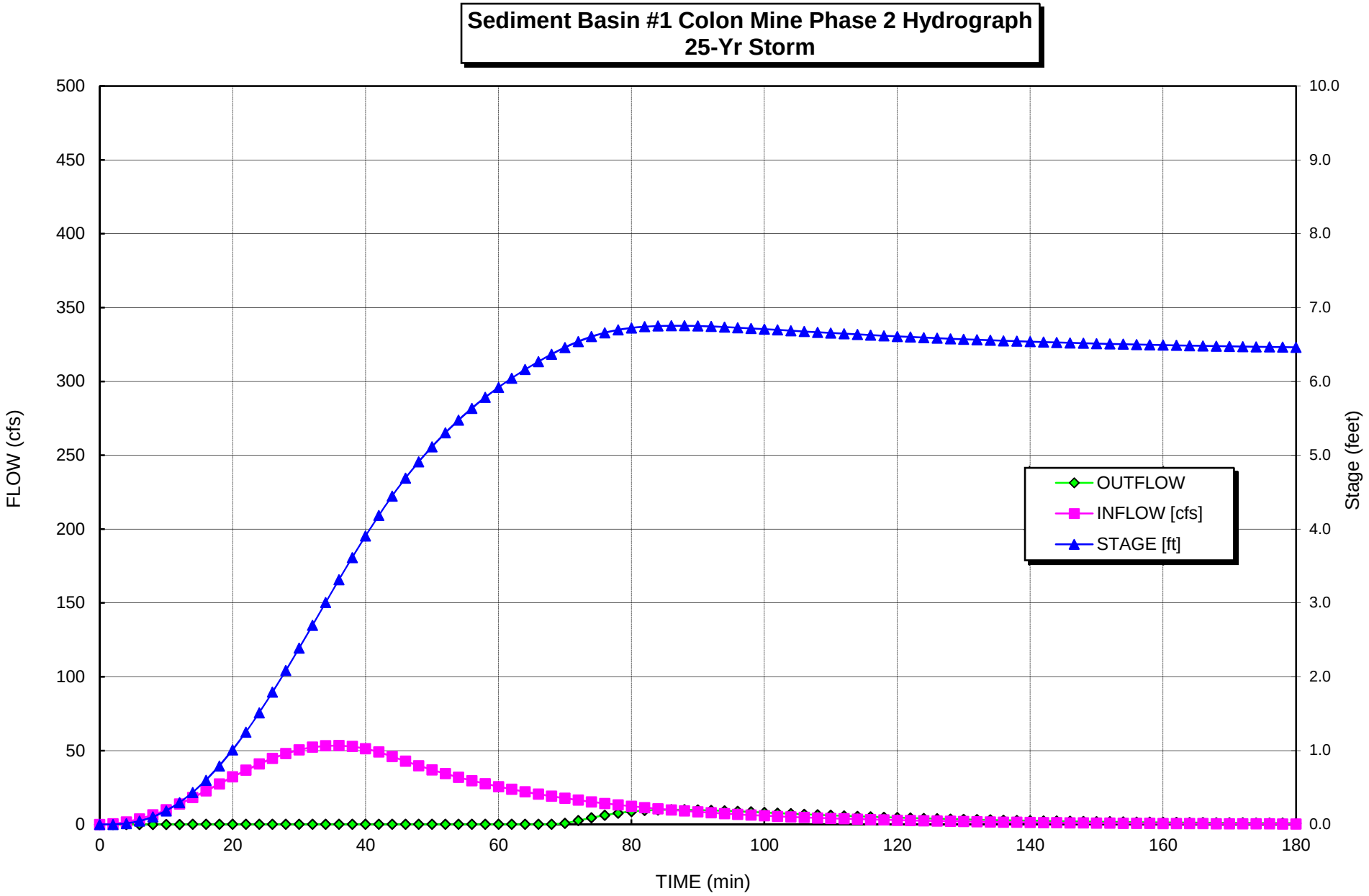
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
97%	Minimum Settling Efficiency		
6.8	ft Maximum Stage	289.8	msl elevation
10.0	cfs Peak outflow		
10.0	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.4	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	1.7	50	0.0	0.00	0.00	0.00	0.00	0.00	11.13	5,061	N/A
6	3.7	251	0.0	0.00	0.00	0.00	0.00	0.00	15.42	7,009	N/A
8	6.5	695	0.1	0.00	0.00	0.00	0.00	0.00	18.97	8,622	N/A
10	9.9	1,471	0.2	0.00	0.00	0.00	0.00	0.00	22.09	10,040	N/A
12	13.8	2,655	0.3	0.00	0.00	0.00	0.00	0.00	24.90	11,319	N/A
14	18.1	4,311	0.4	0.11	0.11	0.00	0.11	0.11	27.48	12,489	100%
16	22.7	6,473	0.6	0.11	0.11	0.00	0.11	0.11	29.84	13,564	100%
18	27.5	9,188	0.8	0.11	0.11	0.00	0.11	0.11	32.04	14,564	100%
20	32.2	12,472	1.0	0.11	0.11	0.00	0.11	0.11	34.09	15,496	100%
22	36.7	16,320	1.3	0.11	0.11	0.00	0.11	0.11	36.01	16,366	100%
24	41.0	20,714	1.5	0.11	0.11	0.00	0.11	0.11	37.79	17,178	100%
26	44.7	25,614	1.8	0.11	0.11	0.00	0.11	0.11	39.46	17,935	100%
28	47.9	30,968	2.1	0.11	0.11	0.00	0.11	0.11	41.01	18,640	100%
30	50.5	36,708	2.4	0.11	0.11	0.00	0.11	0.11	42.45	19,295	100%
32	52.3	42,753	2.7	0.11	0.11	0.00	0.11	0.11	43.78	19,901	100%
34	53.3	49,015	3.0	0.11	0.11	0.00	0.11	0.11	45.02	20,461	100%
36	53.5	55,396	3.3	0.11	0.11	0.00	0.11	0.11	46.15	20,976	100%
38	52.8	61,796	3.6	0.11	0.11	0.00	0.11	0.11	47.18	21,447	100%
40	51.3	68,115	3.9	0.11	0.11	0.00	0.11	0.11	48.13	21,876	100%
42	49.0	74,255	4.2	0.11	0.11	0.00	0.11	0.11	48.98	22,262	100%
44	46.0	80,122	4.4	0.11	0.11	0.00	0.11	0.11	49.74	22,609	100%
46	42.8	85,634	4.7	0.11	0.11	0.00	0.11	0.11	50.42	22,917	100%
48	39.8	90,761	4.9	0.11	0.11	0.00	0.11	0.11	51.02	23,189	100%
50	37.0	95,524	5.1	0.11	0.11	0.00	0.11	0.11	51.55	23,431	100%
52	34.4	99,948	5.3	0.11	0.11	0.00	0.11	0.11	52.02	23,647	100%
54	31.9	104,058	5.5	0.11	0.11	0.00	0.11	0.11	52.45	23,842	100%
56	29.7	107,876	5.6	0.11	0.11	0.00	0.11	0.11	52.84	24,017	100%
58	27.6	111,422	5.8	0.11	0.11	0.00	0.11	0.11	53.18	24,175	100%
60	25.6	114,717	5.9	0.11	0.11	0.00	0.11	0.11	53.50	24,318	100%
62	23.8	117,777	6.0	0.11	0.11	0.00	0.11	0.11	53.79	24,449	100%
64	22.1	120,619	6.2	0.11	0.11	0.00	0.11	0.11	54.05	24,568	100%
66	20.5	123,259	6.3	0.11	0.11	0.00	0.11	0.11	54.29	24,676	100%
68	19.1	125,711	6.4	0.11	0.11	0.00	0.11	0.11	54.50	24,775	100%
70	17.7	127,988	6.5	0.11	0.78	0.00	20.30	0.78	54.70	24,865	100%
72	16.5	130,023	6.5	0.11	2.58	0.00	20.44	2.58	54.88	24,945	100%
74	15.3	131,691	6.6	0.11	4.52	0.00	20.56	4.52	55.02	25,010	99%
76	14.2	132,986	6.7	0.11	6.27	0.00	20.65	6.27	55.13	25,059	99%
78	13.2	133,941	6.7	0.11	7.68	0.00	20.72	7.68	55.21	25,096	98%
80	12.3	134,607	6.7	0.11	8.71	0.00	20.76	8.71	55.27	25,121	98%
82	11.4	135,036	6.7	0.11	9.40	0.00	20.79	9.40	55.30	25,137	98%
84	10.6	135,278	6.8	0.11	9.79	0.00	20.81	9.79	55.32	25,146	97%

86	9.9	135,375	6.8	0.11	9.95	0.00	20.82	9.95	55.33	25,150	97%
88	9.2	135,363	6.8	0.11	9.93	0.00	20.82	9.93	55.33	25,150	97%
90	8.5	135,269	6.8	0.11	9.78	0.00	20.81	9.78	55.32	25,146	97%
92	7.9	135,117	6.7	0.11	9.53	0.00	20.80	9.53	55.31	25,140	97%
94	7.3	134,922	6.7	0.11	9.21	0.00	20.79	9.21	55.29	25,133	98%
96	6.8	134,697	6.7	0.11	8.85	0.00	20.77	8.85	55.27	25,125	98%
98	6.3	134,454	6.7	0.11	8.47	0.00	20.75	8.47	55.25	25,115	98%
100	5.9	134,199	6.7	0.11	8.07	0.00	20.74	8.07	55.23	25,106	98%
102	5.5	133,937	6.7	0.11	7.67	0.00	20.72	7.67	55.21	25,096	98%
104	5.1	133,674	6.7	0.11	7.27	0.00	20.70	7.27	55.19	25,086	98%
106	4.7	133,411	6.7	0.11	6.88	0.00	20.68	6.88	55.17	25,076	99%
108	4.4	133,152	6.7	0.11	6.51	0.00	20.66	6.51	55.14	25,066	99%
110	4.1	132,898	6.7	0.11	6.15	0.00	20.64	6.15	55.12	25,056	99%
112	3.8	132,650	6.6	0.11	5.80	0.00	20.63	5.80	55.10	25,047	99%
114	3.5	132,410	6.6	0.11	5.47	0.00	20.61	5.47	55.08	25,037	99%
116	3.3	132,176	6.6	0.11	5.15	0.00	20.59	5.15	55.06	25,028	99%
118	3.0	131,950	6.6	0.11	4.86	0.00	20.58	4.86	55.04	25,020	99%
120	2.8	131,732	6.6	0.11	4.58	0.00	20.56	4.58	55.02	25,011	99%
122	2.6	131,522	6.6	0.11	4.31	0.00	20.55	4.31	55.01	25,003	99%
124	2.4	131,320	6.6	0.11	4.06	0.00	20.53	4.06	54.99	24,995	99%
126	2.3	131,126	6.6	0.11	3.82	0.00	20.52	3.82	54.97	24,988	99%
128	2.1	130,940	6.6	0.11	3.60	0.00	20.51	3.60	54.96	24,981	100%
130	2.0	130,760	6.6	0.11	3.39	0.00	20.50	3.39	54.94	24,974	100%
132	1.8	130,588	6.6	0.11	3.19	0.00	20.48	3.19	54.93	24,967	100%
134	1.7	130,423	6.6	0.11	3.01	0.00	20.47	3.01	54.91	24,961	100%
136	1.6	130,265	6.6	0.11	2.83	0.00	20.46	2.83	54.90	24,954	100%
138	1.5	130,113	6.5	0.11	2.67	0.00	20.45	2.67	54.89	24,948	100%
140	1.4	129,968	6.5	0.11	2.52	0.00	20.44	2.52	54.87	24,943	100%
142	1.3	129,828	6.5	0.11	2.37	0.00	20.43	2.37	54.86	24,937	100%
144	1.2	129,695	6.5	0.11	2.24	0.00	20.42	2.24	54.85	24,932	100%
146	1.1	129,566	6.5	0.11	2.11	0.00	20.41	2.11	54.84	24,927	100%
148	1.0	129,444	6.5	0.11	1.99	0.00	20.40	1.99	54.83	24,922	100%
150	0.9	129,326	6.5	0.11	1.88	0.00	20.39	1.88	54.82	24,918	100%
152	0.9	129,213	6.5	0.11	1.77	0.00	20.39	1.77	54.81	24,913	100%
154	0.8	129,105	6.5	0.11	1.67	0.00	20.38	1.67	54.80	24,909	100%
156	0.8	129,001	6.5	0.11	1.58	0.00	20.37	1.58	54.79	24,905	100%
158	0.7	128,902	6.5	0.11	1.49	0.00	20.36	1.49	54.78	24,901	100%
160	0.7	128,806	6.5	0.11	1.41	0.00	20.36	1.41	54.77	24,897	100%
162	0.6	128,715	6.5	0.11	1.34	0.00	20.35	1.34	54.77	24,894	100%
164	0.6	128,627	6.5	0.11	1.26	0.00	20.34	1.26	54.76	24,890	100%
166	0.5	128,543	6.5	0.11	1.19	0.00	20.34	1.19	54.75	24,887	100%
168	0.5	128,462	6.5	0.11	1.13	0.00	20.33	1.13	54.74	24,884	100%
170	0.5	128,384	6.5	0.11	1.07	0.00	20.33	1.07	54.74	24,881	100%
172	0.4	128,310	6.5	0.11	1.01	0.00	20.32	1.01	54.73	24,878	100%
174	0.4	128,239	6.5	0.11	0.96	0.00	20.32	0.96	54.73	24,875	100%
176	0.4	128,170	6.5	0.11	0.91	0.00	20.31	0.91	54.72	24,872	100%
178	0.3	128,104	6.5	0.11	0.86	0.00	20.31	0.86	54.71	24,870	100%
180	0.3	128,041	6.5	0.11	0.82	0.00	20.30	0.82	54.71	24,867	100%
182	0.3	127,980	6.5	0.11	0.78	0.00	20.30	0.78	54.70	24,865	100%
184	0.3	127,922	6.5	0.11	0.74	0.00	20.29	0.74	54.70	24,863	100%
186	0.3	127,866	6.5	0.11	0.70	0.00	20.29	0.70	54.69	24,860	100%
188	0.2	127,812	6.5	0.11	0.66	0.00	20.29	0.66	54.69	24,858	100%
190	0.2	127,760	6.4	0.11	0.63	0.00	20.28	0.63	54.68	24,856	100%
192	0.2	127,710	6.4	0.11	0.60	0.00	20.28	0.60	54.68	24,854	100%
194	0.2	127,662	6.4	0.11	0.57	0.00	20.27	0.57	54.68	24,852	100%
196	0.2	127,616	6.4	0.11	0.54	0.00	20.27	0.54	54.67	24,850	100%
198	0.2	127,571	6.4	0.11	0.52	0.00	20.27	0.52	54.67	24,849	100%
200	0.1	127,528	6.4	0.11	0.49	0.00	20.27	0.49	54.66	24,847	100%
202	0.1	127,487	6.4	0.11	0.47	0.00	20.26	0.47	54.66	24,845	100%
204	0.1	127,447	6.4	0.11	0.45	0.00	20.26	0.45	54.66	24,844	100%
206	0.1	127,409	6.4	0.11	0.43	0.00	20.26	0.43	54.65	24,842	100%


Sediment Basin #1 Colon Mine Phase 2 Hydrograph
25-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Sediment Basin # 1 Colon

Phase 2

100 - year Storm Event

Qp =	70.1	cfs
Tp =	35.9	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.3

Ks = 12,318

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	18	(in)	
Height of Riser above barrel =	4.9	(ft)	
Height of Riser from bottom of barrel=	6.4	(ft) elevation	289.40
Emergency Spillway =	7.0	(ft) elevation	290.00
Total Height of Dam =	7.5	(ft) elevation	290.50
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	54	(in)	
Permanent Pond Stage =	0	(ft) elevation	283.0

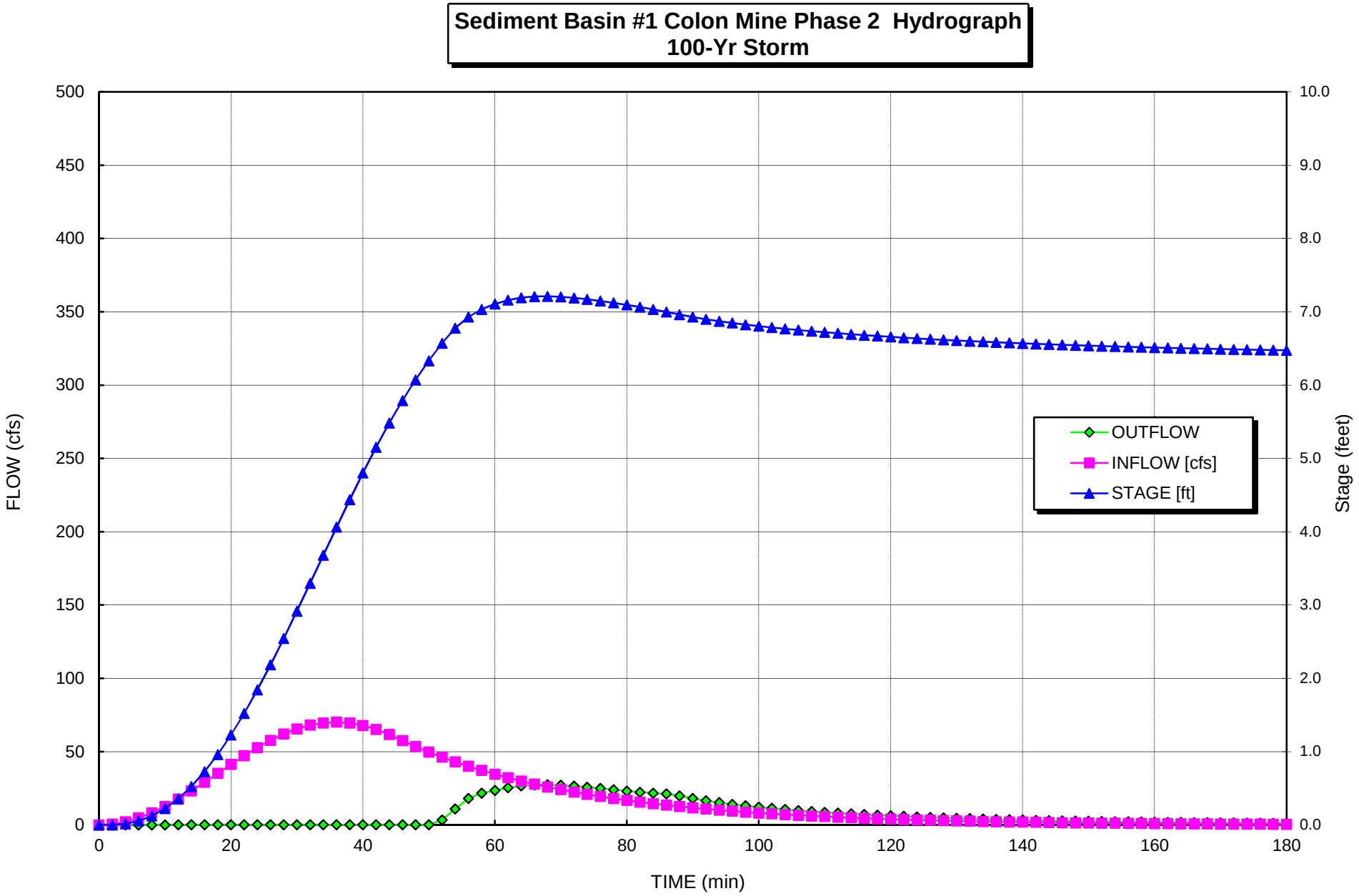
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
88%	Minimum Settling Efficiency		
7.2	ft Maximum Stage	290.2	msl elevation
27.4	cfs Peak outflow		
21.6	cfs Peak Riser/Barrel outflow		
5.8	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.5	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	2.1	64	0.0	0.00	0.00	0.00	0.00	0.00	11.69	5,315	N/A
6	4.7	319	0.1	0.00	0.00	0.00	0.00	0.00	16.19	7,361	N/A
8	8.2	885	0.1	0.00	0.00	0.00	0.00	0.00	19.92	9,056	N/A
10	12.6	1,874	0.2	0.00	0.00	0.00	0.00	0.00	23.20	10,545	N/A
12	17.6	3,383	0.4	0.11	0.11	0.00	0.11	0.11	26.16	11,889	100%
14	23.2	5,482	0.5	0.11	0.11	0.00	0.11	0.11	28.85	13,114	100%
16	29.1	8,248	0.7	0.11	0.11	0.00	0.11	0.11	31.35	14,248	100%
18	35.2	11,724	1.0	0.11	0.11	0.00	0.11	0.11	33.67	15,303	100%
20	41.3	15,932	1.2	0.11	0.11	0.00	0.11	0.11	35.83	16,286	100%
22	47.2	20,872	1.5	0.11	0.11	0.00	0.11	0.11	37.85	17,204	100%
24	52.7	26,521	1.8	0.11	0.11	0.00	0.11	0.11	39.74	18,062	100%
26	57.7	32,834	2.2	0.11	0.11	0.00	0.11	0.11	41.50	18,863	100%
28	62.0	39,747	2.5	0.11	0.11	0.00	0.11	0.11	43.14	19,609	100%
30	65.5	47,175	2.9	0.11	0.11	0.00	0.11	0.11	44.67	20,303	100%
32	68.0	55,022	3.3	0.11	0.11	0.00	0.11	0.11	46.08	20,948	100%
34	69.6	63,174	3.7	0.11	0.11	0.00	0.11	0.11	47.40	21,544	100%
36	70.1	71,510	4.1	0.11	0.11	0.00	0.11	0.11	48.60	22,093	100%
38	69.5	79,905	4.4	0.11	0.11	0.00	0.11	0.11	49.71	22,596	100%
40	67.8	88,229	4.8	0.11	0.11	0.00	0.11	0.11	50.72	23,056	100%
42	65.2	96,357	5.2	0.11	0.11	0.00	0.11	0.11	51.64	23,472	100%
44	61.6	104,168	5.5	0.11	0.11	0.00	0.11	0.11	52.46	23,847	100%
46	57.5	111,551	5.8	0.11	0.11	0.00	0.11	0.11	53.20	24,181	100%
48	53.5	118,437	6.1	0.11	0.11	0.00	0.11	0.11	53.85	24,477	100%
50	49.7	124,842	6.3	0.11	0.11	0.00	0.11	0.11	54.43	24,740	100%
52	46.3	130,798	6.6	0.11	3.43	0.00	20.50	3.43	54.95	24,975	100%
54	43.0	135,939	6.8	0.11	10.90	0.00	20.86	10.90	55.38	25,171	97%
56	40.0	139,795	6.9	0.11	18.09	0.00	21.12	18.09	55.69	25,315	93%
58	37.2	142,428	7.0	0.11	23.63	0.37	21.29	21.66	55.90	25,411	91%
60	34.6	144,298	7.1	0.11	27.84	2.10	21.42	23.51	56.05	25,478	90%
62	32.2	145,632	7.2	0.11	30.97	3.81	21.51	25.32	56.16	25,526	89%
64	30.0	146,460	7.2	0.11	32.97	5.03	21.56	26.59	56.22	25,555	88%
66	27.9	146,865	7.2	0.11	33.96	5.67	21.59	27.26	56.25	25,570	88%
68	25.9	146,939	7.2	0.11	34.14	5.79	21.59	27.38	56.26	25,572	88%
70	24.1	146,765	7.2	0.11	33.71	5.51	21.58	27.09	56.25	25,566	88%
72	22.4	146,408	7.2	0.11	32.84	4.95	21.56	26.51	56.22	25,553	88%
74	20.9	145,918	7.2	0.11	31.66	4.22	21.53	25.75	56.18	25,536	89%
76	19.4	145,332	7.1	0.11	30.26	3.40	21.49	24.88	56.13	25,515	89%
78	18.1	144,675	7.1	0.11	28.71	2.55	21.44	23.99	56.08	25,492	90%
80	16.8	143,962	7.1	0.11	27.07	1.72	21.40	23.12	56.03	25,466	90%
82	15.6	143,203	7.1	0.11	25.35	0.97	21.35	22.31	55.97	25,439	91%
84	14.5	142,399	7.0	0.11	23.57	0.35	21.29	21.64	55.90	25,410	91%

86	13.5	141,546	7.0	0.11	21.72	0.00	21.24	21.24	55.83	25,379	91%
88	12.6	140,619	7.0	0.11	19.77	0.00	21.17	19.77	55.76	25,345	92%
90	11.7	139,754	6.9	0.11	18.01	0.00	21.12	18.01	55.69	25,313	93%
92	10.9	138,996	6.9	0.11	16.51	0.00	21.06	16.51	55.63	25,285	94%
94	10.1	138,320	6.9	0.11	15.20	0.00	21.02	15.20	55.57	25,260	95%
96	9.4	137,709	6.8	0.11	14.06	0.00	20.98	14.06	55.52	25,238	95%
98	8.7	137,151	6.8	0.11	13.03	0.00	20.94	13.03	55.48	25,217	96%
100	8.1	136,637	6.8	0.11	12.12	0.00	20.90	12.12	55.43	25,198	96%
102	7.6	136,160	6.8	0.11	11.28	0.00	20.87	11.28	55.40	25,180	97%
104	7.0	135,714	6.8	0.11	10.52	0.00	20.84	10.52	55.36	25,163	97%
106	6.5	135,296	6.8	0.11	9.83	0.00	20.81	9.83	55.32	25,147	97%
108	6.1	134,903	6.7	0.11	9.18	0.00	20.78	9.18	55.29	25,132	98%
110	5.7	134,532	6.7	0.11	8.59	0.00	20.76	8.59	55.26	25,118	98%
112	5.3	134,181	6.7	0.11	8.04	0.00	20.73	8.04	55.23	25,105	98%
114	4.9	133,848	6.7	0.11	7.54	0.00	20.71	7.54	55.20	25,092	98%
116	4.6	133,532	6.7	0.11	7.06	0.00	20.69	7.06	55.18	25,080	98%
118	4.2	133,232	6.7	0.11	6.62	0.00	20.67	6.62	55.15	25,069	99%
120	3.9	132,946	6.7	0.11	6.21	0.00	20.65	6.21	55.13	25,058	99%
122	3.7	132,674	6.6	0.11	5.83	0.00	20.63	5.83	55.10	25,047	99%
124	3.4	132,414	6.6	0.11	5.48	0.00	20.61	5.48	55.08	25,037	99%
126	3.2	132,167	6.6	0.11	5.14	0.00	20.59	5.14	55.06	25,028	99%
128	3.0	131,931	6.6	0.11	4.83	0.00	20.58	4.83	55.04	25,019	99%
130	2.7	131,705	6.6	0.11	4.54	0.00	20.56	4.54	55.02	25,010	99%
132	2.6	131,490	6.6	0.11	4.27	0.00	20.55	4.27	55.00	25,002	99%
134	2.4	131,284	6.6	0.11	4.01	0.00	20.53	4.01	54.99	24,994	99%
136	2.2	131,088	6.6	0.11	3.78	0.00	20.52	3.78	54.97	24,986	100%
138	2.1	130,900	6.6	0.11	3.55	0.00	20.50	3.55	54.95	24,979	100%
140	1.9	130,720	6.6	0.11	3.34	0.00	20.49	3.34	54.94	24,972	100%
142	1.8	130,548	6.6	0.11	3.15	0.00	20.48	3.15	54.92	24,965	100%
144	1.7	130,384	6.6	0.11	2.96	0.00	20.47	2.96	54.91	24,959	100%
146	1.5	130,227	6.5	0.11	2.79	0.00	20.46	2.79	54.90	24,953	100%
148	1.4	130,076	6.5	0.11	2.63	0.00	20.45	2.63	54.88	24,947	100%
150	1.3	129,932	6.5	0.11	2.48	0.00	20.44	2.48	54.87	24,941	100%
152	1.2	129,794	6.5	0.11	2.34	0.00	20.43	2.34	54.86	24,936	100%
154	1.2	129,662	6.5	0.11	2.21	0.00	20.42	2.21	54.85	24,931	100%
156	1.1	129,536	6.5	0.11	2.08	0.00	20.41	2.08	54.84	24,926	100%
158	1.0	129,415	6.5	0.11	1.96	0.00	20.40	1.96	54.83	24,921	100%
160	0.9	129,299	6.5	0.11	1.85	0.00	20.39	1.85	54.82	24,917	100%
162	0.9	129,187	6.5	0.11	1.75	0.00	20.38	1.75	54.81	24,912	100%
164	0.8	129,081	6.5	0.11	1.65	0.00	20.38	1.65	54.80	24,908	100%
166	0.7	128,979	6.5	0.11	1.56	0.00	20.37	1.56	54.79	24,904	100%
168	0.7	128,881	6.5	0.11	1.48	0.00	20.36	1.48	54.78	24,900	100%
170	0.6	128,787	6.5	0.11	1.40	0.00	20.36	1.40	54.77	24,897	100%
172	0.6	128,697	6.5	0.11	1.32	0.00	20.35	1.32	54.76	24,893	100%
174	0.6	128,610	6.5	0.11	1.25	0.00	20.34	1.25	54.76	24,890	100%
176	0.5	128,527	6.5	0.11	1.18	0.00	20.34	1.18	54.75	24,886	100%
178	0.5	128,448	6.5	0.11	1.12	0.00	20.33	1.12	54.74	24,883	100%
180	0.4	128,371	6.5	0.11	1.06	0.00	20.33	1.06	54.74	24,880	100%
182	0.4	128,298	6.5	0.11	1.00	0.00	20.32	1.00	54.73	24,877	100%
184	0.4	128,228	6.5	0.11	0.95	0.00	20.32	0.95	54.72	24,875	100%
186	0.4	128,160	6.5	0.11	0.90	0.00	20.31	0.90	54.72	24,872	100%
188	0.3	128,095	6.5	0.11	0.86	0.00	20.31	0.86	54.71	24,869	100%
190	0.3	128,033	6.5	0.11	0.81	0.00	20.30	0.81	54.71	24,867	100%
192	0.3	127,973	6.5	0.11	0.77	0.00	20.30	0.77	54.70	24,865	100%
194	0.3	127,915	6.5	0.11	0.73	0.00	20.29	0.73	54.70	24,862	100%
196	0.3	127,860	6.5	0.11	0.70	0.00	20.29	0.70	54.69	24,860	100%
198	0.2	127,806	6.5	0.11	0.66	0.00	20.29	0.66	54.69	24,858	100%
200	0.2	127,755	6.4	0.11	0.63	0.00	20.28	0.63	54.68	24,856	100%
202	0.2	127,706	6.4	0.11	0.60	0.00	20.28	0.60	54.68	24,854	100%
204	0.2	127,658	6.4	0.11	0.57	0.00	20.27	0.57	54.67	24,852	100%


Sediment Basin #1 Colon Mine Phase 2 Hydrograph
100-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #2	Sheet: 1	Of: 4

Objective Design the sediment basin to contain the 10-year storm and pass the 100-year storm without over topping the berm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. VA Erosion and Sediment Control Handbook
3. NOAA Atlas 14, Volume 2, Version 3

Given

Phase	1	2	2	2		
Storm Event (yrs) =	10	10	25	100		
Total Drainage Area A (ac) =	17.6	14.8	14.8	14.8		
Disturbed Area (ac) =	17.6	14.8	14.8	14.8		
Curve Number CN =	86	87	87	87	Hydrographs	
Rainfall Depth P (in) =	5.28	5.28	6.28	7.88	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	101.32	79.90	98.71	128.64	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	31,680	cf (based on largest Phase)
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	44,074	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
259	0	0	-	-	-
259	0	37,790	0	0	0
260	1	40,921	39,345	39,345	1,457
261	2	44,109	42,505	81,850	3,031
262	3	47,355	45,722	127,573	4,725
263	4	50,658	48,997	176,570	6,540
264	5	54,018	52,329	228,899	8,478
265	6	57,435	55,718	284,617	10,541

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 127,573 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 47,355 *Required Surface Area Achieved*

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #2	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	127,573		
Number of Skimmers	2		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	12,757	0.15	cfs
Selected Skimmer Size (inches) =	4		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	3.1		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	2	2	2
Storm Event (yrs) =	10	10	25	100
S =	1.63	1.49	1.49	1.49
Runoff Depth Q* (inches) =	3.73	3.83	4.79	6.33
Time to Peak T_p (min) =	28.19	30.89	31.23	31.71

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	127,573
Z_2 (ft) =	6	S_2 (cf) =	284,617

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.2 Ref 2, III-8

$K_S = S_2/Z_2^{\,b}$ = 35,760

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #2	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor =	3.281	ft/sec per m/sec	
Gravitational Acceleration, g (m/s^2) =	9.81		
Specific Gravity of soil (s_s) =	2.6		
Kinematic Viscosity of water (ν) =	1.14E-06	n^2 / sec @ 20° C	Ref 2, IV-11
Diameter of the Design Particle d_{15} =	40.00E-06	m	

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / \nu] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 6.00
Set Top of Dam at (ft) = 7.00

See Hydrograph

Emergency Spillway

Q_E (cfs) = 100-Yr Storm
Q_E (cfs) = 0.0

Cross Section =	Trapezoid		
Channel Side Slope (z) =	5	(enter X for X:1)	
n =	0.03	Grass Lined	
Vp (ft/sec) =	5.0	Permissible Velocity for lining	Ref 2, II-7
Allowable Shear Stress (psf) =	2.0	Allowable Shear Stress for lining	
Bottom Width, b (ft) =	15		

Calculate Required Depth of Spillway:

Normal-Depth Procedure

$AR^{2/3}=Qn/1.49s^{0.5}$ Q=VA

$Z_{req}=Qn/1.49s^{0.5}$ Area (A)= bd+z(d^2)

$Z_{av}=AR^{2/3}$ R=Area/(b+2d((z^2)+1)^.5)

Avg Shear Stress(T) = K_b*d*s*unit weight of water

Channel Slope ft/ft	Depth, d (ft)	A (sf)	Z_{req}	R	Z_{avail}	V (ft/sec)	T (psf)
0.01	0.00	0.00	0.00	0.00	0.00	0.0	0.0
0.02	0.00	0.00	0.00	0.00	0.00	0.0	0.0

Construct the channel to be :	15	ft, Bottom Width (measured at top of lining)
	1.0	ft, depth (measured at top of lining)
	1%	slope

Anti-Seep Collar:

Anti-Seep Collar Size =	2 * Barrel Dia	
Anti-Seep Collar Size (ft) =	4	
Use Anti-Seep Collar Size (ft) =	4	x 4

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #2	Sheet: 4	Of: 4

Minimum Concrete Base for Riser:

Diameter of Riser (in) =	60	From Hydrograph
Avg Density of Concrete (lbs/cf) =	87.6	
Density of Water (lbs/cf) =	62.4	
Riser Displacement (cf) =	102.10	Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy =	27^{-1}	
Min Concrete Needed (cy) =	2.69	
Width & Length (ft) =	6	
Thickness (ft) =	2.0	

Anti-Vortex Device:

Diameter of Riser (in) =	60	From Hydrograph
Cylinder Diameter (in) =	90	Ref 3, III-104, Table 3.14-D
Cylinder Thickness (gage) =	14	
Cylinder Height (in) =	29	

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	12	6 * Barrel Diameter
Q_B (cfs) =	3.8	Peak Flow out of the barrel 25-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
3.8	1.24	0.25	3.3	0.23	1.24	1.1

Flow Depth = Tailwater, d (ft) = 0.25 0.5* Barrel Diameter (ft) = 1.00 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
2	6	10	12	0.3	Class A

Conclusion

The basin can contain the 10-yr storm and pass the 100-yr storm without overtopping the berm.

HDR Computation

Job No. 06985-10570-018

Project:	Charah Colon Mine	Computed: PAW	Date: 12/31/14
Subject:	Permit Application	Checked: EAW	Date: 1/2/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	60	
Circumference of Riser (in) =	188.5	
eight of Riser from bottom of barrel (in) =	62	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	2	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.30	0.30
0.39	0.00	0.00	0.00			0.30	0.30
0.44	0.00	0.00	0.00			0.30	0.30
0.49	0.00	0.00	0.00			0.30	0.30
0.54	0.00	0.00	0.00			0.30	0.30
0.59	0.00	0.00	0.00			0.30	0.30
0.64	0.00	0.00	0.00			0.30	0.30
0.69	0.00	0.00	0.00			0.30	0.30
0.74	0.00	0.00	0.00			0.30	0.30
0.79	0.00	0.00	0.00			0.30	0.30
0.84	0.00	0.00	0.00			0.30	0.30
0.89	0.00	0.00	0.00			0.30	0.30
0.94	0.00	0.00	0.00			0.30	0.30
0.99	0.00	0.00	0.00			0.30	0.30
1.04	0.00	0.00	0.00			0.30	0.30
1.09	0.00	0.00	0.00			0.30	0.30
1.14	0.00	0.00	0.00			0.30	0.30
1.19	0.00	0.00	0.00			0.30	0.30
1.24	0.00	0.00	0.00			0.30	0.30
1.29	0.00	0.00	0.00			0.30	0.30
1.34	0.00	0.00	0.00			0.30	0.30
1.39	0.00	0.00	0.00			0.30	0.30
1.44	0.00	0.00	0.00			0.30	0.30
1.49	0.00	0.00	0.00			0.30	0.30
1.54	0.00	0.00	0.00			0.30	0.30
1.59	0.00	0.00	0.00			0.30	0.30

1.64	0.00	0.00	0.00	0.30	0.30
1.69	0.00	0.00	0.00	0.30	0.30
1.74	0.00	0.00	0.00	0.30	0.30
1.79	0.00	0.00	0.00	0.30	0.30
1.84	0.00	0.00	0.00	0.30	0.30
1.89	0.00	0.00	0.00	0.30	0.30
1.94	0.00	0.00	0.00	0.30	0.30
1.99	0.00	0.00	0.00	0.30	0.30
2.04	0.00	0.00	0.00	0.30	0.30
2.09	0.00	0.00	0.00	0.30	0.30
2.14	0.00	0.00	0.00	0.30	0.30
2.19	0.00	0.00	0.00	0.30	0.30
2.24	0.00	0.00	0.00	0.30	0.30
2.29	0.00	0.00	0.00	0.30	0.30
2.34	0.00	0.00	0.00	0.30	0.30
2.39	0.00	0.00	0.00	0.30	0.30
2.44	0.00	0.00	0.00	0.30	0.30
2.49	0.00	0.00	0.00	0.30	0.30
2.54	0.00	0.00	0.00	0.30	0.30
2.59	0.00	0.00	0.00	0.30	0.30
2.64	0.00	0.00	0.00	0.30	0.30
2.69	0.00	0.00	0.00	0.30	0.30
2.74	0.00	0.00	0.00	0.30	0.30
2.79	0.00	0.00	0.00	0.30	0.30
2.84	0.00	0.00	0.00	0.30	0.30
2.89	0.00	0.00	0.00	0.30	0.30
2.94	0.00	0.00	0.00	0.30	0.30
2.99	0.00	0.00	0.00	0.30	0.30
3.04	0.00	0.00	0.00	0.30	0.30
3.09	0.00	0.00	0.00	0.30	0.30
3.14	0.00	0.00	0.00	0.30	0.30
3.19	0.00	0.00	0.00	0.30	0.30
3.24	0.00	0.00	0.00	0.30	0.30
3.29	0.00	0.00	0.00	0.30	0.30
3.34	0.00	0.00	0.00	0.30	0.30
3.39	0.00	0.00	0.00	0.30	0.30
3.44	0.00	0.00	0.00	0.30	0.30
3.49	0.00	0.00	0.00	0.30	0.30
3.54	0.00	0.00	0.00	0.30	0.30
3.59	0.00	0.00	0.00	0.30	0.30
3.64	0.00	0.00	0.00	0.30	0.30
3.69	0.00	0.00	0.00	0.30	0.30
3.74	0.00	0.00	0.00	0.30	0.30
3.79	0.00	0.00	0.00	0.30	0.30
3.84	0.00	0.00	0.00	0.30	0.30
3.89	0.00	0.00	0.00	0.30	0.30
3.94	0.00	0.00	0.00	0.30	0.30
3.99	0.00	0.00	0.00	0.30	0.30

Qp = 101.32 cfs

Tp = 28.19 minutes

dT = Max of **2** minutes

or **1.0%** of increment to peak

Sediment Basin # 2 Colon

Phase 1

10 - year Storm Event

b = 1.2

K_s = 35,760

Number of Riser/Barrel Assemblies	**2**			
Diameter of Barrel =	**24**	(in)		
Height of Riser above barrel =	**3.2**	(ft)		
Height of Riser from bottom of barrel=	**5.2**	(ft) elevation	264.20	
Emergency Spillway =	**6.0**	(ft) elevation	265.00	
Total Height of Dam =	**7.0**	(ft) elevation	266.00	
Length of Emergency Spillway =	**15**	(ft)		
Diameter of Riser =	**60**	(in)		
Permanent Pond Stage =	**0**	(ft) elevation	259.0	

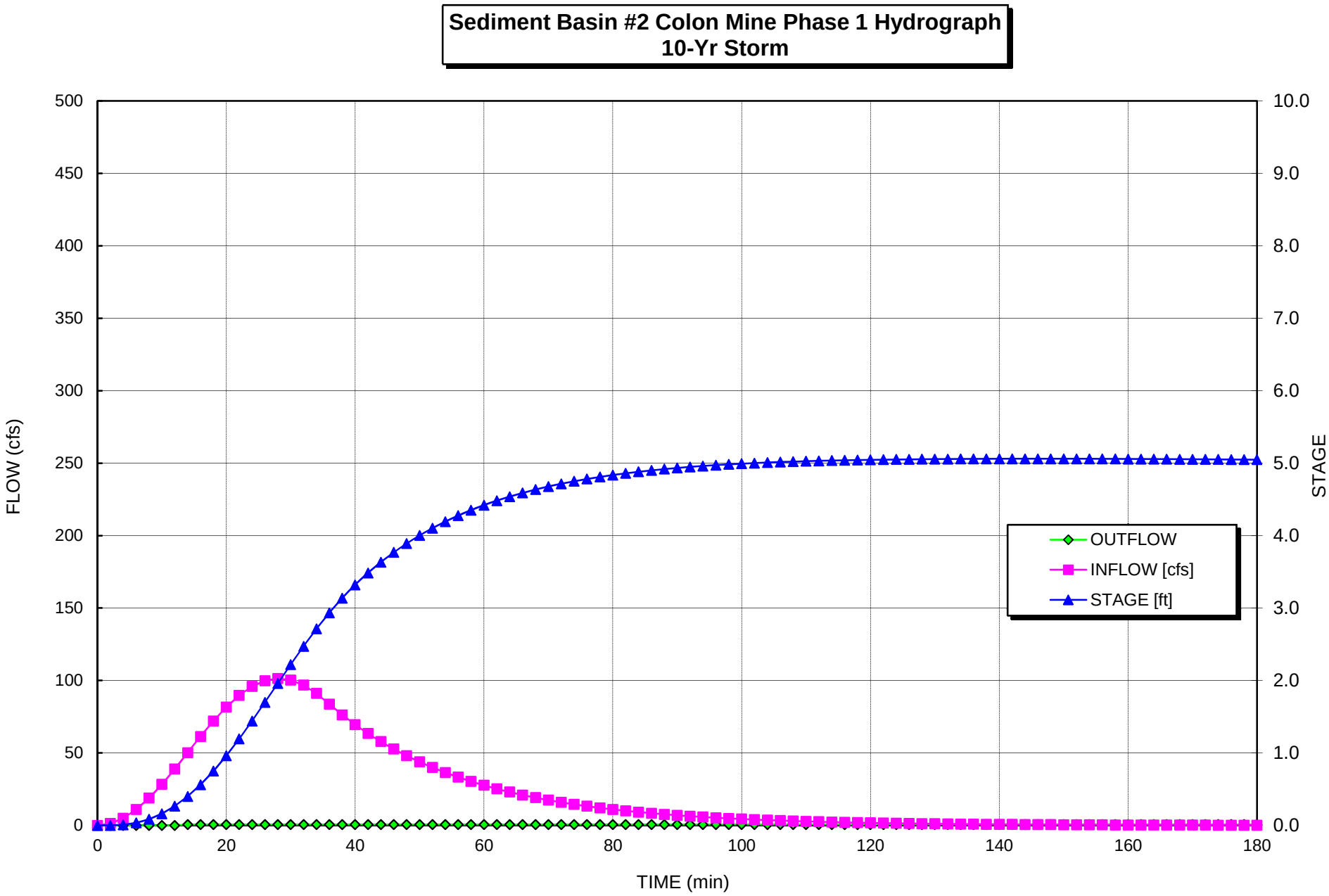
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.1	ft Maximum Stage	264.06	msl elevation
0.6	cfs Peak outflow		
0.6	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	4.9	150	0.0	0.00	0.00	0.00	0.00	0.00	43.22	19,647	N/A
6	10.9	744	0.0	0.00	0.00	0.00	0.00	0.00	53.74	24,429	N/A
8	18.8	2,053	0.1	0.00	0.00	0.00	0.00	0.00	61.71	28,050	N/A
10	28.3	4,312	0.2	0.00	0.00	0.00	0.00	0.00	68.28	31,035	N/A
12	38.9	7,712	0.3	0.00	0.00	0.00	0.00	0.00	73.90	33,592	N/A
14	50.1	12,383	0.4	0.30	0.30	0.00	0.30	0.59	78.83	35,830	100%
16	61.3	18,326	0.6	0.30	0.30	0.00	0.30	0.59	83.15	37,796	100%
18	72.0	25,613	0.7	0.30	0.30	0.00	0.30	0.59	87.03	39,559	100%
20	81.6	34,183	1.0	0.30	0.30	0.00	0.30	0.59	90.52	41,145	100%
22	89.7	43,907	1.2	0.30	0.30	0.00	0.30	0.59	93.66	42,573	100%
24	95.9	54,603	1.4	0.30	0.30	0.00	0.30	0.59	96.48	43,856	100%
26	99.8	66,039	1.7	0.30	0.30	0.00	0.30	0.59	99.02	45,007	100%
28	101.3	77,946	2.0	0.30	0.30	0.00	0.30	0.59	101.28	46,035	100%
30	100.3	90,032	2.2	0.30	0.30	0.00	0.30	0.59	103.28	46,948	100%
32	96.8	101,997	2.5	0.30	0.30	0.00	0.30	0.59	105.06	47,752	100%
34	91.1	113,546	2.7	0.30	0.30	0.00	0.30	0.59	106.60	48,455	100%
36	83.6	124,405	2.9	0.30	0.30	0.00	0.30	0.59	107.94	49,062	100%
38	76.3	134,368	3.1	0.30	0.30	0.00	0.30	0.59	109.08	49,580	100%
40	69.5	143,448	3.3	0.30	0.30	0.00	0.30	0.59	110.05	50,023	100%
42	63.4	151,721	3.5	0.30	0.30	0.00	0.30	0.59	110.89	50,407	100%
44	57.8	159,259	3.6	0.30	0.30	0.00	0.30	0.59	111.63	50,741	100%
46	52.7	166,127	3.8	0.30	0.30	0.00	0.30	0.59	112.27	51,033	100%
48	48.1	172,384	3.9	0.30	0.30	0.00	0.30	0.59	112.84	51,291	100%
50	43.8	178,083	4.0	0.30	0.30	0.00	0.30	0.59	113.34	51,519	100%
52	40.0	183,274	4.1	0.30	0.30	0.00	0.30	0.59	113.79	51,721	100%
54	36.5	188,001	4.2	0.30	0.30	0.00	0.30	0.59	114.18	51,901	100%
56	33.3	192,306	4.3	0.30	0.30	0.00	0.30	0.59	114.53	52,061	100%
58	30.3	196,225	4.4	0.30	0.30	0.00	0.30	0.59	114.85	52,204	100%
60	27.7	199,793	4.4	0.30	0.30	0.00	0.30	0.59	115.13	52,332	100%
62	25.2	203,040	4.5	0.30	0.30	0.00	0.30	0.59	115.38	52,448	100%
64	23.0	205,995	4.5	0.30	0.30	0.00	0.30	0.59	115.61	52,551	100%
66	21.0	208,684	4.6	0.30	0.30	0.00	0.30	0.59	115.82	52,644	100%
68	19.1	211,129	4.6	0.30	0.30	0.00	0.30	0.59	116.00	52,727	100%
70	17.4	213,353	4.7	0.30	0.30	0.00	0.30	0.59	116.17	52,803	100%
72	15.9	215,374	4.7	0.30	0.30	0.00	0.30	0.59	116.32	52,871	100%
74	14.5	217,211	4.8	0.30	0.30	0.00	0.30	0.59	116.45	52,932	100%
76	13.2	218,881	4.8	0.30	0.30	0.00	0.30	0.59	116.57	52,987	100%
78	12.1	220,396	4.8	0.30	0.30	0.00	0.30	0.59	116.68	53,037	100%
80	11.0	221,772	4.8	0.30	0.30	0.00	0.30	0.59	116.78	53,082	100%
82	10.0	223,021	4.9	0.30	0.30	0.00	0.30	0.59	116.87	53,122	100%

84	9.1	224,153	4.9	0.30	0.30	0.00	0.30	0.59	116.95	53,159	100%
86	8.3	225,180	4.9	0.30	0.30	0.00	0.30	0.59	117.02	53,192	100%
88	7.6	226,110	4.9	0.30	0.30	0.00	0.30	0.59	117.09	53,222	100%
90	6.9	226,951	4.9	0.30	0.30	0.00	0.30	0.59	117.15	53,249	100%
92	6.3	227,712	4.9	0.30	0.30	0.00	0.30	0.59	117.20	53,273	100%
94	5.8	228,400	5.0	0.30	0.30	0.00	0.30	0.59	117.25	53,295	100%
96	5.3	229,021	5.0	0.30	0.30	0.00	0.30	0.59	117.29	53,315	100%
98	4.8	229,581	5.0	0.30	0.30	0.00	0.30	0.59	117.33	53,333	100%
100	4.4	230,086	5.0	0.30	0.30	0.00	0.30	0.59	117.37	53,349	100%
102	4.0	230,540	5.0	0.30	0.30	0.00	0.30	0.59	117.40	53,363	100%
104	3.6	230,947	5.0	0.30	0.30	0.00	0.30	0.59	117.43	53,376	100%
106	3.3	231,313	5.0	0.30	0.30	0.00	0.30	0.59	117.45	53,387	100%
108	3.0	231,640	5.0	0.30	0.30	0.00	0.30	0.59	117.47	53,398	100%
110	2.8	231,932	5.0	0.30	0.30	0.00	0.30	0.59	117.49	53,407	100%
112	2.5	232,192	5.0	0.30	0.30	0.00	0.30	0.59	117.51	53,415	100%
114	2.3	232,422	5.0	0.30	0.30	0.00	0.30	0.59	117.53	53,422	100%
116	2.1	232,627	5.0	0.30	0.30	0.00	0.30	0.59	117.54	53,428	100%
118	1.9	232,807	5.0	0.30	0.30	0.00	0.30	0.59	117.55	53,434	100%
120	1.7	232,965	5.0	0.30	0.30	0.00	0.30	0.59	117.57	53,439	100%
122	1.6	233,102	5.0	0.30	0.30	0.00	0.30	0.59	117.58	53,443	100%
124	1.4	233,222	5.1	0.30	0.30	0.00	0.30	0.59	117.58	53,447	100%
126	1.3	233,325	5.1	0.30	0.30	0.00	0.30	0.59	117.59	53,450	100%
128	1.2	233,412	5.1	0.30	0.30	0.00	0.30	0.59	117.60	53,453	100%
130	1.1	233,485	5.1	0.30	0.30	0.00	0.30	0.59	117.60	53,455	100%
132	1.0	233,546	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,457	100%
134	0.9	233,595	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,459	100%
136	0.8	233,634	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,460	100%
138	0.8	233,663	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,461	100%
140	0.7	233,683	5.1	0.30	0.30	0.00	0.30	0.59	117.62	53,461	100%
142	0.6	233,695	5.1	0.30	0.30	0.00	0.30	0.59	117.62	53,462	100%
144	0.6	233,700	5.1	0.30	0.30	0.00	0.30	0.59	117.62	53,462	100%
146	0.5	233,698	5.1	0.30	0.30	0.00	0.30	0.59	117.62	53,462	100%
148	0.5	233,690	5.1	0.30	0.30	0.00	0.30	0.59	117.62	53,462	100%
150	0.4	233,676	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,461	100%
152	0.4	233,658	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,461	100%
154	0.4	233,634	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,460	100%
156	0.3	233,607	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,459	100%
158	0.3	233,576	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,458	100%
160	0.3	233,541	5.1	0.30	0.30	0.00	0.30	0.59	117.61	53,457	100%
162	0.3	233,503	5.1	0.30	0.30	0.00	0.30	0.59	117.60	53,456	100%
164	0.2	233,463	5.1	0.30	0.30	0.00	0.30	0.59	117.60	53,455	100%
166	0.2	233,419	5.1	0.30	0.30	0.00	0.30	0.59	117.60	53,453	100%
168	0.2	233,373	5.1	0.30	0.30	0.00	0.30	0.59	117.59	53,452	100%
170	0.2	233,325	5.1	0.30	0.30	0.00	0.30	0.59	117.59	53,450	100%
172	0.2	233,275	5.1	0.30	0.30	0.00	0.30	0.59	117.59	53,449	100%
174	0.1	233,223	5.1	0.30	0.30	0.00	0.30	0.59	117.58	53,447	100%
176	0.1	233,170	5.1	0.30	0.30	0.00	0.30	0.59	117.58	53,445	100%
178	0.1	233,115	5.0	0.30	0.30	0.00	0.30	0.59	117.58	53,444	100%
180	0.1	233,058	5.0	0.30	0.30	0.00	0.30	0.59	117.57	53,442	100%
182	0.1	233,000	5.0	0.30	0.30	0.00	0.30	0.59	117.57	53,440	100%
184	0.1	232,941	5.0	0.30	0.30	0.00	0.30	0.59	117.56	53,438	100%
186	0.1	232,881	5.0	0.30	0.30	0.00	0.30	0.59	117.56	53,436	100%
188	0.1	232,821	5.0	0.30	0.30	0.00	0.30	0.59	117.56	53,435	100%
190	0.1	232,759	5.0	0.30	0.30	0.00	0.30	0.59	117.55	53,433	100%
192	0.1	232,696	5.0	0.30	0.30	0.00	0.30	0.59	117.55	53,431	100%
194	0.1	232,633	5.0	0.30	0.30	0.00	0.30	0.59	117.54	53,429	100%
196	0.1	232,569	5.0	0.30	0.30	0.00	0.30	0.59	117.54	53,427	100%
198	0.0	232,504	5.0	0.30	0.30	0.00	0.30	0.59	117.53	53,425	100%
200	0.0	232,439	5.0	0.30	0.30	0.00	0.30	0.59	117.53	53,423	100%
202	0.0	232,373	5.0	0.30	0.30	0.00	0.30	0.59	117.53	53,421	100%
204	0.0	232,307	5.0	0.30	0.30	0.00	0.30	0.59	117.52	53,418	100%
206	0.0	232,241	5.0	0.30	0.30	0.00	0.30	0.59	117.52	53,416	100%


Sediment Basin #2 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

Sediment Basin # 2 Colon

Phase 2

10 - year Storm Event

Qp = 79.90 cfs

Tp = 30.89 minutes

dT = Max of **2** minutes

or **1.0%** of increment to peak

b = 1.2

Ks = 35,760

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	3.2	(ft)	
Height of Riser from bottom of barrel=	5.2	(ft) elevation	264.20
Emergency Spillway =	6	(ft) elevation	265.00
Total Height of Dam =	7	(ft) elevation	266.00
Length of Emergency Spillway =	15	(ft)	
Diameter of Riser =	60	(in)	
Permanent Pond Stage =	0	(ft) elevation	259.0

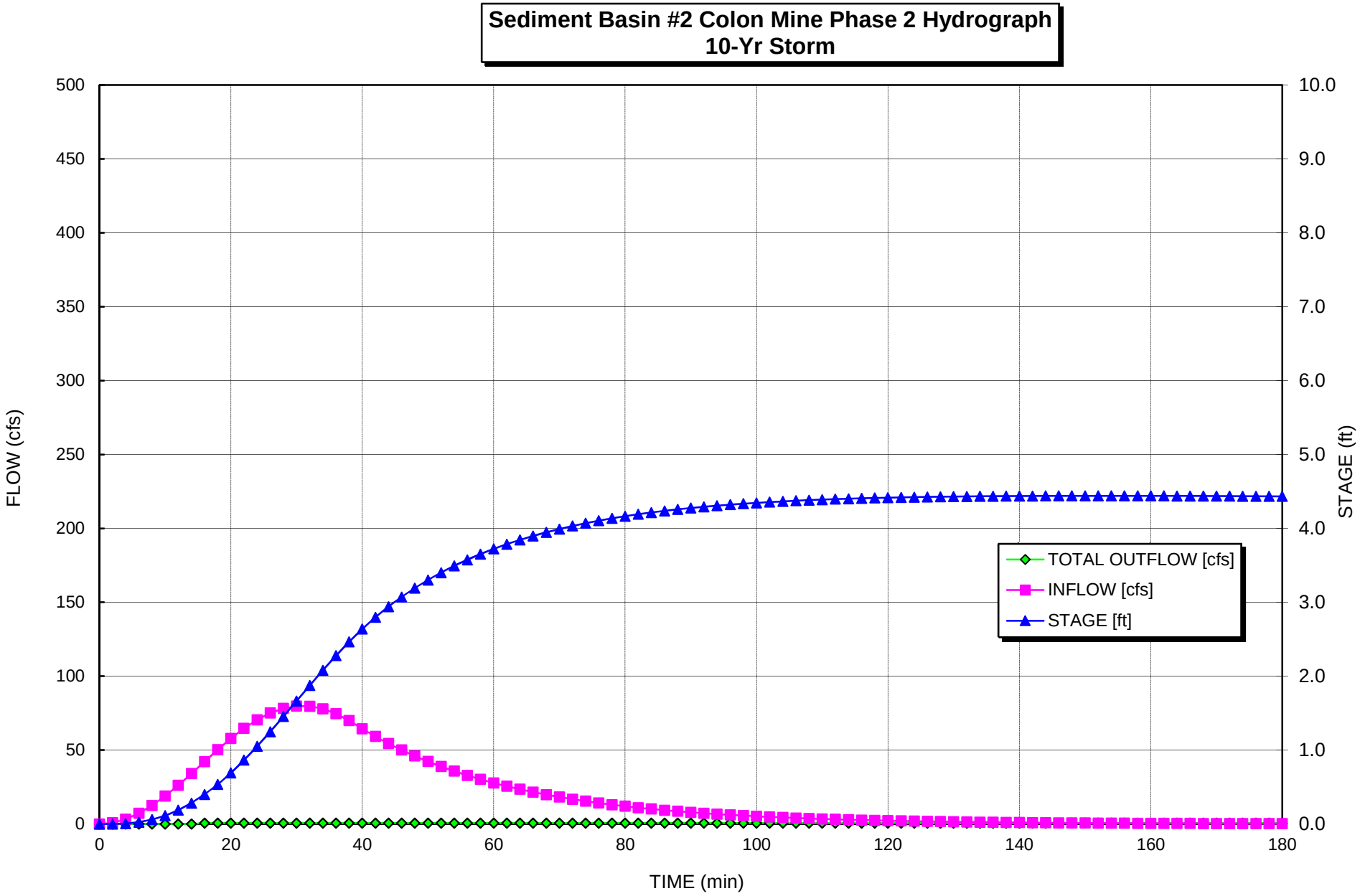
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
4.4	ft Maximum Stage	263.44	msl elevation
0.6	cfs Peak outflow		
0.6	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.8	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	3.3	99	0.0	0.00	0.00	0.00	0.00	0.00	40.82	18,555	N/A
6	7.2	490	0.0	0.00	0.00	0.00	0.00	0.00	50.77	23,077	N/A
8	12.5	1,355	0.1	0.00	0.00	0.00	0.00	0.00	58.32	26,507	N/A
10	18.9	2,856	0.1	0.00	0.00	0.00	0.00	0.00	64.55	29,341	N/A
12	26.2	5,129	0.2	0.00	0.00	0.00	0.00	0.00	69.91	31,776	N/A
14	34.1	8,277	0.3	0.00	0.00	0.00	0.00	0.00	74.62	33,917	N/A
16	42.2	12,368	0.4	0.30	0.30	0.00	0.30	0.59	78.81	35,825	100%
18	50.2	17,361	0.5	0.30	0.30	0.00	0.30	0.59	82.54	37,518	100%
20	57.8	23,316	0.7	0.30	0.30	0.00	0.30	0.59	85.92	39,056	100%
22	64.6	30,180	0.9	0.30	0.30	0.00	0.30	0.59	89.00	40,453	100%
24	70.5	37,867	1.1	0.30	0.30	0.00	0.30	0.59	91.79	41,723	100%
26	75.1	46,254	1.2	0.30	0.30	0.00	0.30	0.59	94.33	42,876	100%
28	78.2	55,190	1.5	0.30	0.30	0.00	0.30	0.59	96.62	43,920	100%
30	79.7	64,502	1.7	0.30	0.30	0.00	0.30	0.59	98.70	44,863	100%
32	79.6	73,999	1.9	0.30	0.30	0.00	0.30	0.59	100.56	45,710	100%
34	77.9	83,486	2.1	0.30	0.30	0.00	0.30	0.59	102.23	46,467	100%
36	74.6	92,765	2.3	0.30	0.30	0.00	0.30	0.59	103.71	47,139	100%
38	69.9	101,650	2.5	0.30	0.30	0.00	0.30	0.59	105.01	47,730	100%
40	64.4	109,968	2.6	0.30	0.30	0.00	0.30	0.59	106.14	48,245	100%
42	59.2	117,628	2.8	0.30	0.30	0.00	0.30	0.59	107.12	48,689	100%
44	54.4	124,663	2.9	0.30	0.30	0.00	0.30	0.59	107.97	49,076	100%
46	50.0	131,124	3.1	0.30	0.30	0.00	0.30	0.59	108.71	49,415	100%
48	46.0	137,059	3.2	0.30	0.30	0.00	0.30	0.59	109.37	49,714	100%
50	42.3	142,508	3.3	0.30	0.30	0.00	0.30	0.59	109.95	49,978	100%
52	38.9	147,512	3.4	0.30	0.30	0.00	0.30	0.59	110.47	50,214	100%
54	35.7	152,106	3.5	0.30	0.30	0.00	0.30	0.59	110.93	50,424	100%
56	32.9	156,324	3.6	0.30	0.30	0.00	0.30	0.59	111.35	50,612	100%
58	30.2	160,196	3.7	0.30	0.30	0.00	0.30	0.59	111.72	50,781	100%
60	27.8	163,749	3.7	0.30	0.30	0.00	0.30	0.59	112.05	50,933	100%
62	25.5	167,010	3.8	0.30	0.30	0.00	0.30	0.59	112.35	51,070	100%
64	23.5	170,002	3.8	0.30	0.30	0.00	0.30	0.59	112.63	51,194	100%
66	21.6	172,746	3.9	0.30	0.30	0.00	0.30	0.59	112.87	51,306	100%
68	19.8	175,264	3.9	0.30	0.30	0.00	0.30	0.59	113.10	51,407	100%
70	18.2	177,572	4.0	0.30	0.30	0.00	0.30	0.59	113.30	51,499	100%
72	16.8	179,689	4.0	0.30	0.30	0.00	0.30	0.59	113.48	51,582	100%
74	15.4	181,628	4.1	0.30	0.30	0.00	0.30	0.59	113.65	51,657	100%
76	14.2	183,406	4.1	0.30	0.30	0.00	0.30	0.59	113.80	51,726	100%
78	13.0	185,034	4.1	0.30	0.30	0.00	0.30	0.59	113.93	51,788	100%
80	12.0	186,525	4.2	0.30	0.30	0.00	0.30	0.59	114.06	51,845	100%
82	11.0	187,891	4.2	0.30	0.30	0.00	0.30	0.59	114.17	51,896	100%
84	10.1	189,140	4.2	0.30	0.30	0.00	0.30	0.59	114.28	51,943	100%

86	9.3	190,282	4.2	0.30	0.30	0.00	0.30	0.59	114.37	51,986	100%
88	8.5	191,327	4.3	0.30	0.30	0.00	0.30	0.59	114.45	52,025	100%
90	7.9	192,282	4.3	0.30	0.30	0.00	0.30	0.59	114.53	52,060	100%
92	7.2	193,154	4.3	0.30	0.30	0.00	0.30	0.59	114.60	52,092	100%
94	6.6	193,949	4.3	0.30	0.30	0.00	0.30	0.59	114.67	52,121	100%
96	6.1	194,675	4.3	0.30	0.30	0.00	0.30	0.59	114.73	52,148	100%
98	5.6	195,337	4.3	0.30	0.30	0.00	0.30	0.59	114.78	52,172	100%
100	5.2	195,939	4.3	0.30	0.30	0.00	0.30	0.59	114.83	52,194	100%
102	4.7	196,487	4.4	0.30	0.30	0.00	0.30	0.59	114.87	52,214	100%
104	4.4	196,985	4.4	0.30	0.30	0.00	0.30	0.59	114.91	52,232	100%
106	4.0	197,437	4.4	0.30	0.30	0.00	0.30	0.59	114.95	52,248	100%
108	3.7	197,847	4.4	0.30	0.30	0.00	0.30	0.59	114.98	52,263	100%
110	3.4	198,218	4.4	0.30	0.30	0.00	0.30	0.59	115.01	52,276	100%
112	3.1	198,554	4.4	0.30	0.30	0.00	0.30	0.59	115.03	52,288	100%
114	2.9	198,856	4.4	0.30	0.30	0.00	0.30	0.59	115.06	52,299	100%
116	2.6	199,129	4.4	0.30	0.30	0.00	0.30	0.59	115.08	52,309	100%
118	2.4	199,374	4.4	0.30	0.30	0.00	0.30	0.59	115.10	52,318	100%
120	2.2	199,593	4.4	0.30	0.30	0.00	0.30	0.59	115.12	52,325	100%
122	2.0	199,789	4.4	0.30	0.30	0.00	0.30	0.59	115.13	52,332	100%
124	1.9	199,963	4.4	0.30	0.30	0.00	0.30	0.59	115.14	52,339	100%
126	1.7	200,118	4.4	0.30	0.30	0.00	0.30	0.59	115.16	52,344	100%
128	1.6	200,254	4.4	0.30	0.30	0.00	0.30	0.59	115.17	52,349	100%
130	1.5	200,374	4.4	0.30	0.30	0.00	0.30	0.59	115.18	52,353	100%
132	1.3	200,478	4.4	0.30	0.30	0.00	0.30	0.59	115.19	52,357	100%
134	1.2	200,568	4.4	0.30	0.30	0.00	0.30	0.59	115.19	52,360	100%
136	1.1	200,645	4.4	0.30	0.30	0.00	0.30	0.59	115.20	52,363	100%
138	1.0	200,710	4.4	0.30	0.30	0.00	0.30	0.59	115.20	52,365	100%
140	1.0	200,764	4.4	0.30	0.30	0.00	0.30	0.59	115.21	52,367	100%
142	0.9	200,809	4.4	0.30	0.30	0.00	0.30	0.59	115.21	52,369	100%
144	0.8	200,843	4.4	0.30	0.30	0.00	0.30	0.59	115.21	52,370	100%
146	0.7	200,870	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,371	100%
148	0.7	200,888	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,371	100%
150	0.6	200,899	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,372	100%
152	0.6	200,904	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,372	100%
154	0.5	200,902	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,372	100%
156	0.5	200,895	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,372	100%
158	0.4	200,883	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,371	100%
160	0.4	200,866	4.4	0.30	0.30	0.00	0.30	0.59	115.22	52,371	100%
162	0.4	200,845	4.4	0.30	0.30	0.00	0.30	0.59	115.21	52,370	100%
164	0.3	200,820	4.4	0.30	0.30	0.00	0.30	0.59	115.21	52,369	100%
166	0.3	200,791	4.4	0.30	0.30	0.00	0.30	0.59	115.21	52,368	100%
168	0.3	200,758	4.4	0.30	0.30	0.00	0.30	0.59	115.21	52,367	100%
170	0.3	200,723	4.4	0.30	0.30	0.00	0.30	0.59	115.20	52,366	100%
172	0.2	200,684	4.4	0.30	0.30	0.00	0.30	0.59	115.20	52,364	100%
174	0.2	200,643	4.4	0.30	0.30	0.00	0.30	0.59	115.20	52,363	100%
176	0.2	200,600	4.4	0.30	0.30	0.00	0.30	0.59	115.19	52,361	100%
178	0.2	200,554	4.4	0.30	0.30	0.00	0.30	0.59	115.19	52,360	100%
180	0.2	200,507	4.4	0.30	0.30	0.00	0.30	0.59	115.19	52,358	100%
182	0.2	200,457	4.4	0.30	0.30	0.00	0.30	0.59	115.18	52,356	100%
184	0.2	200,406	4.4	0.30	0.30	0.00	0.30	0.59	115.18	52,354	100%
186	0.1	200,353	4.4	0.30	0.30	0.00	0.30	0.59	115.18	52,352	100%
188	0.1	200,299	4.4	0.30	0.30	0.00	0.30	0.59	115.17	52,351	100%
190	0.1	200,243	4.4	0.30	0.30	0.00	0.30	0.59	115.17	52,349	100%
192	0.1	200,186	4.4	0.30	0.30	0.00	0.30	0.59	115.16	52,347	100%
194	0.1	200,128	4.4	0.30	0.30	0.00	0.30	0.59	115.16	52,344	100%
196	0.1	200,069	4.4	0.30	0.30	0.00	0.30	0.59	115.15	52,342	100%
198	0.1	200,009	4.4	0.30	0.30	0.00	0.30	0.59	115.15	52,340	100%
200	0.1	199,949	4.4	0.30	0.30	0.00	0.30	0.59	115.14	52,338	100%
202	0.1	199,887	4.4	0.30	0.30	0.00	0.30	0.59	115.14	52,336	100%
204	0.1	199,824	4.4	0.30	0.30	0.00	0.30	0.59	115.13	52,334	100%


Sediment Basin #2 Colon Mine Phase 2 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE (ft)
TIME (min)
TOTAL OUTFLOW [cfs]
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Sediment Basin # 2 Colon

Phase 2

25 - year Storm Event

Qp =	98.71	cfs
Tp =	31.23	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.2

Ks = 35,760

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	3.2	(ft)	
Height of Riser from bottom of barrel=	5.2	(ft) elevation	264.20
Emergency Spillway =	6.0	(ft) elevation	265.00
Total Height of Dam =	7.0	(ft) elevation	266.00
Length of Emergency Spillway =	15	(ft)	
Diameter of Riser =	60	(in)	
Permanent Pond Stage =	0	(ft) elevation	259.0

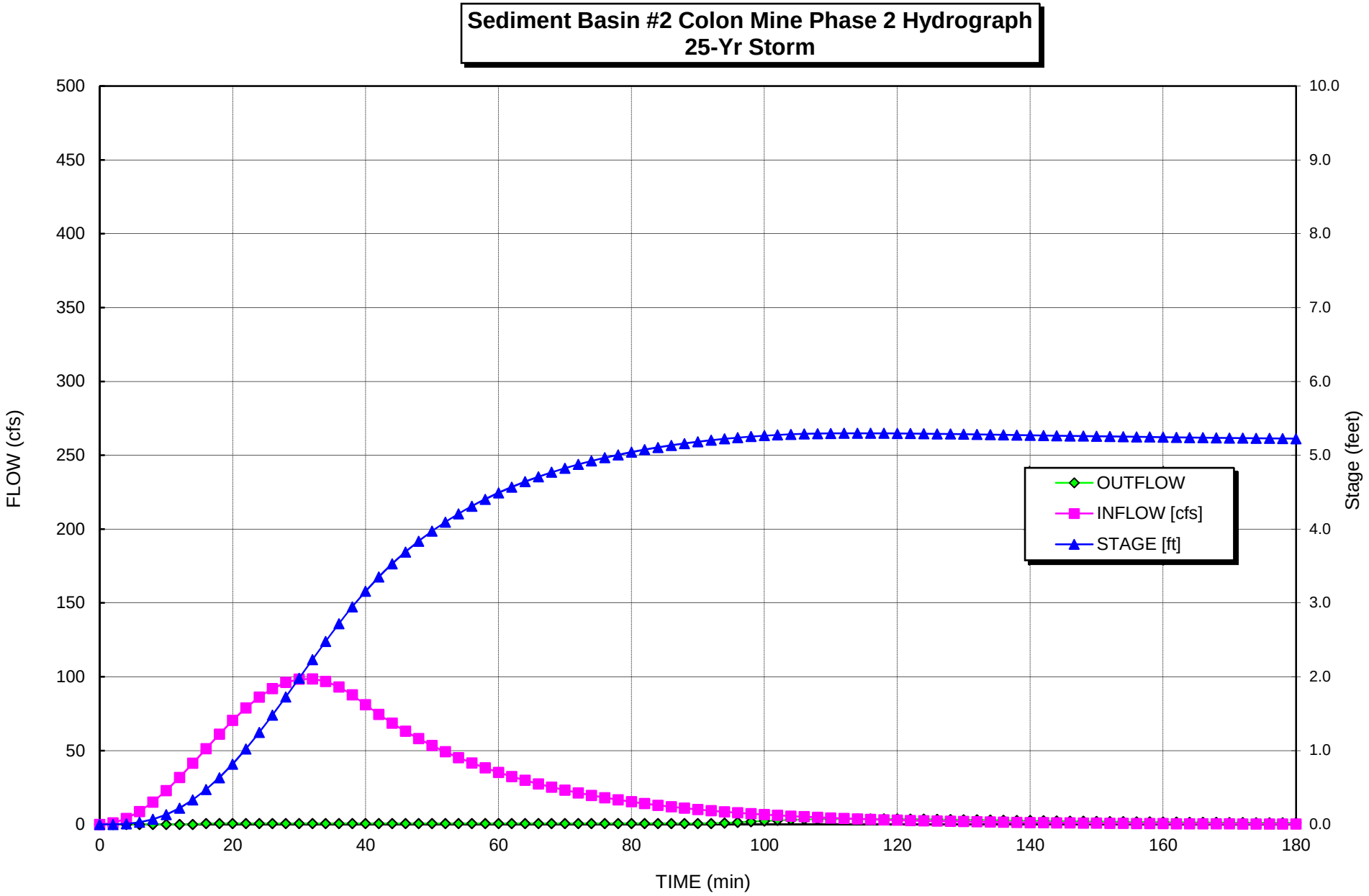
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.3	ft Maximum Stage	264.3	msl elevation
3.8	cfs Peak outflow		
3.8	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	3.9	119	0.0	0.00	0.00	0.00	0.00	0.00	41.89	19,041	N/A
6	8.7	592	0.0	0.00	0.00	0.00	0.00	0.00	52.10	23,682	N/A
8	15.1	1,639	0.1	0.00	0.00	0.00	0.00	0.00	59.85	27,203	N/A
10	22.9	3,455	0.1	0.00	0.00	0.00	0.00	0.00	66.25	30,112	N/A
12	31.8	6,208	0.2	0.00	0.00	0.00	0.00	0.00	71.75	32,614	N/A
14	41.4	10,024	0.3	0.00	0.00	0.00	0.00	0.00	76.59	34,813	N/A
16	51.3	14,988	0.5	0.30	0.30	0.00	0.30	0.59	80.90	36,775	100%
18	61.1	21,069	0.6	0.30	0.30	0.00	0.30	0.59	84.75	38,521	100%
20	70.4	28,328	0.8	0.30	0.30	0.00	0.30	0.59	88.23	40,106	100%
22	78.9	36,708	1.0	0.30	0.30	0.00	0.30	0.59	91.40	41,547	100%
24	86.2	46,108	1.2	0.30	0.30	0.00	0.30	0.59	94.29	42,857	100%
26	92.0	56,384	1.5	0.30	0.30	0.00	0.30	0.59	96.91	44,048	100%
28	96.1	67,357	1.7	0.30	0.30	0.00	0.30	0.59	99.28	45,128	100%
30	98.3	78,821	2.0	0.30	0.30	0.00	0.30	0.59	101.43	46,105	100%
32	98.6	90,550	2.2	0.30	0.30	0.00	0.30	0.59	103.37	46,984	100%
34	96.8	102,307	2.5	0.30	0.30	0.00	0.30	0.59	105.10	47,772	100%
36	93.1	113,853	2.7	0.30	0.30	0.00	0.30	0.59	106.64	48,473	100%
38	87.7	124,958	2.9	0.30	0.30	0.00	0.30	0.59	108.00	49,092	100%
40	81.0	135,412	3.2	0.30	0.30	0.00	0.30	0.59	109.19	49,632	100%
42	74.6	145,066	3.4	0.30	0.30	0.00	0.30	0.59	110.22	50,100	100%
44	68.6	153,944	3.5	0.30	0.30	0.00	0.30	0.59	111.11	50,507	100%
46	63.1	162,107	3.7	0.30	0.30	0.00	0.30	0.59	111.90	50,863	100%
48	58.1	169,612	3.8	0.30	0.30	0.00	0.30	0.59	112.59	51,178	100%
50	53.5	176,512	4.0	0.30	0.30	0.00	0.30	0.59	113.20	51,457	100%
52	49.2	182,855	4.1	0.30	0.30	0.00	0.30	0.59	113.75	51,705	100%
54	45.3	188,686	4.2	0.30	0.30	0.00	0.30	0.59	114.24	51,926	100%
56	41.6	194,045	4.3	0.30	0.30	0.00	0.30	0.59	114.67	52,125	100%
58	38.3	198,971	4.4	0.30	0.30	0.00	0.30	0.59	115.07	52,303	100%
60	35.3	203,497	4.5	0.30	0.30	0.00	0.30	0.59	115.42	52,464	100%
62	32.4	207,656	4.6	0.30	0.30	0.00	0.30	0.59	115.74	52,608	100%
64	29.8	211,478	4.6	0.30	0.30	0.00	0.30	0.59	116.03	52,739	100%
66	27.5	214,988	4.7	0.30	0.30	0.00	0.30	0.59	116.29	52,858	100%
68	25.3	218,212	4.8	0.30	0.30	0.00	0.30	0.59	116.52	52,965	100%
70	23.2	221,173	4.8	0.30	0.30	0.00	0.30	0.59	116.74	53,062	100%
72	21.4	223,892	4.9	0.30	0.30	0.00	0.30	0.59	116.93	53,151	100%
74	19.7	226,388	4.9	0.30	0.30	0.00	0.30	0.59	117.11	53,231	100%
76	18.1	228,679	5.0	0.30	0.30	0.00	0.30	0.59	117.27	53,304	100%
78	16.7	230,782	5.0	0.30	0.30	0.00	0.30	0.59	117.42	53,371	100%
80	15.3	232,710	5.0	0.30	0.30	0.00	0.30	0.59	117.55	53,431	100%
82	14.1	234,479	5.1	0.30	0.30	0.00	0.30	0.59	117.67	53,486	100%
84	13.0	236,101	5.1	0.30	0.30	0.00	0.30	0.59	117.78	53,536	100%

86	11.9	237,588	5.1	0.30	0.30	0.00	0.30	0.59	117.88	53,582	100%
88	11.0	238,951	5.2	0.30	0.30	0.00	0.30	0.59	117.97	53,624	100%
90	10.1	240,199	5.2	0.30	0.30	0.00	0.30	0.59	118.06	53,662	100%
92	9.3	241,341	5.2	0.30	0.31	0.00	30.96	0.61	118.13	53,697	100%
94	8.6	242,384	5.2	0.30	0.47	0.00	31.04	0.95	118.20	53,728	100%
96	7.9	243,298	5.2	0.30	0.71	0.00	31.10	1.41	118.26	53,756	100%
98	7.2	244,074	5.3	0.30	0.95	0.00	31.15	1.90	118.31	53,779	100%
100	6.7	244,716	5.3	0.30	1.18	0.00	31.19	2.35	118.36	53,798	100%
102	6.1	245,234	5.3	0.30	1.38	0.00	31.23	2.75	118.39	53,814	100%
104	5.6	245,640	5.3	0.30	1.54	0.00	31.26	3.08	118.42	53,826	100%
106	5.2	245,948	5.3	0.30	1.67	0.00	31.28	3.34	118.44	53,835	100%
108	4.8	246,170	5.3	0.30	1.77	0.00	31.29	3.54	118.45	53,842	100%
110	4.4	246,319	5.3	0.30	1.83	0.00	31.30	3.67	118.46	53,846	100%
112	4.0	246,407	5.3	0.30	1.87	0.00	31.31	3.75	118.47	53,849	100%
114	3.7	246,443	5.3	0.30	1.89	0.00	31.31	3.78	118.47	53,850	100%
116	3.4	246,436	5.3	0.30	1.89	0.00	31.31	3.77	118.47	53,850	100%
118	3.2	246,394	5.3	0.30	1.87	0.00	31.31	3.74	118.47	53,849	100%
120	2.9	246,324	5.3	0.30	1.84	0.00	31.30	3.67	118.46	53,846	100%
122	2.7	246,231	5.3	0.30	1.80	0.00	31.30	3.59	118.46	53,844	100%
124	2.5	246,121	5.3	0.30	1.75	0.00	31.29	3.49	118.45	53,840	100%
126	2.3	245,996	5.3	0.30	1.69	0.00	31.28	3.38	118.44	53,837	100%
128	2.1	245,861	5.3	0.30	1.63	0.00	31.27	3.27	118.43	53,833	100%
130	1.9	245,719	5.3	0.30	1.57	0.00	31.26	3.15	118.42	53,828	100%
132	1.8	245,570	5.3	0.30	1.51	0.00	31.25	3.02	118.41	53,824	100%
134	1.6	245,419	5.3	0.30	1.45	0.00	31.24	2.90	118.40	53,819	100%
136	1.5	245,265	5.3	0.30	1.39	0.00	31.23	2.78	118.39	53,815	100%
138	1.4	245,111	5.3	0.30	1.33	0.00	31.22	2.65	118.38	53,810	100%
140	1.3	244,957	5.3	0.30	1.27	0.00	31.21	2.53	118.37	53,806	100%
142	1.2	244,804	5.3	0.30	1.21	0.00	31.20	2.42	118.36	53,801	100%
144	1.1	244,653	5.3	0.30	1.15	0.00	31.19	2.31	118.35	53,797	100%
146	1.0	244,505	5.3	0.30	1.10	0.00	31.18	2.20	118.34	53,792	100%
148	0.9	244,359	5.3	0.30	1.05	0.00	31.17	2.09	118.33	53,788	100%
150	0.8	244,216	5.3	0.30	1.00	0.00	31.16	1.99	118.32	53,783	100%
152	0.8	244,077	5.3	0.30	0.95	0.00	31.15	1.90	118.31	53,779	100%
154	0.7	243,941	5.3	0.30	0.90	0.00	31.14	1.81	118.31	53,775	100%
156	0.6	243,808	5.2	0.30	0.86	0.00	31.13	1.72	118.30	53,771	100%
158	0.6	243,679	5.2	0.30	0.82	0.00	31.12	1.64	118.29	53,767	100%
160	0.5	243,554	5.2	0.30	0.78	0.00	31.11	1.56	118.28	53,764	100%
162	0.5	243,432	5.2	0.30	0.75	0.00	31.11	1.49	118.27	53,760	100%
164	0.5	243,314	5.2	0.30	0.71	0.00	31.10	1.42	118.26	53,756	100%
166	0.4	243,199	5.2	0.30	0.68	0.00	31.09	1.36	118.26	53,753	100%
168	0.4	243,088	5.2	0.30	0.65	0.00	31.08	1.29	118.25	53,750	100%
170	0.4	242,980	5.2	0.30	0.62	0.00	31.08	1.24	118.24	53,746	100%
172	0.3	242,875	5.2	0.30	0.59	0.00	31.07	1.18	118.23	53,743	100%
174	0.3	242,773	5.2	0.30	0.56	0.00	31.06	1.13	118.23	53,740	100%
176	0.3	242,675	5.2	0.30	0.54	0.00	31.05	1.08	118.22	53,737	100%
178	0.3	242,579	5.2	0.30	0.52	0.00	31.05	1.03	118.22	53,734	100%
180	0.2	242,486	5.2	0.30	0.50	0.00	31.04	0.99	118.21	53,731	100%
182	0.2	242,396	5.2	0.30	0.48	0.00	31.04	0.95	118.20	53,729	100%
184	0.2	242,308	5.2	0.30	0.46	0.00	31.03	0.91	118.20	53,726	100%
186	0.2	242,222	5.2	0.30	0.44	0.00	31.02	0.88	118.19	53,723	100%
188	0.2	242,139	5.2	0.30	0.42	0.00	31.02	0.84	118.19	53,721	100%
190	0.2	242,059	5.2	0.30	0.41	0.00	31.01	0.81	118.18	53,719	100%
192	0.1	241,980	5.2	0.30	0.39	0.00	31.01	0.78	118.18	53,716	100%
194	0.1	241,903	5.2	0.30	0.38	0.00	31.00	0.76	118.17	53,714	100%
196	0.1	241,828	5.2	0.30	0.37	0.00	31.00	0.73	118.17	53,712	100%
198	0.1	241,755	5.2	0.30	0.36	0.00	30.99	0.71	118.16	53,709	100%
200	0.1	241,683	5.2	0.30	0.34	0.00	30.99	0.69	118.16	53,707	100%
202	0.1	241,613	5.2	0.30	0.33	0.00	30.98	0.67	118.15	53,705	100%
204	0.1	241,544	5.2	0.30	0.33	0.00	30.98	0.65	118.15	53,703	100%
206	0.1	241,476	5.2	0.30	0.32	0.00	30.97	0.64	118.14	53,701	100%


Sediment Basin #2 Colon Mine Phase 2 Hydrograph
25-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Computed By: PAW Date: 12/31/14

Checked By: EAW Date: 1/2/15

Sheet: _1__of __2_

Sediment Basin # 2 Colon

Phase 2

100 - year Storm Event

Qp =	128.6	cfs
Tp =	31.7	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.2

Ks = 35,760

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	3.2	(ft)	
Height of Riser from bottom of barrel=	5.2	(ft) elevation	264.20
Emergency Spillway =	6.0	(ft) elevation	265.00
Total Height of Dam =	7.0	(ft) elevation	266.00
Length of Emergency Spillway =	15	(ft)	
Diameter of Riser =	60	(in)	
Permanent Pond Stage =	0	(ft) elevation	259.0

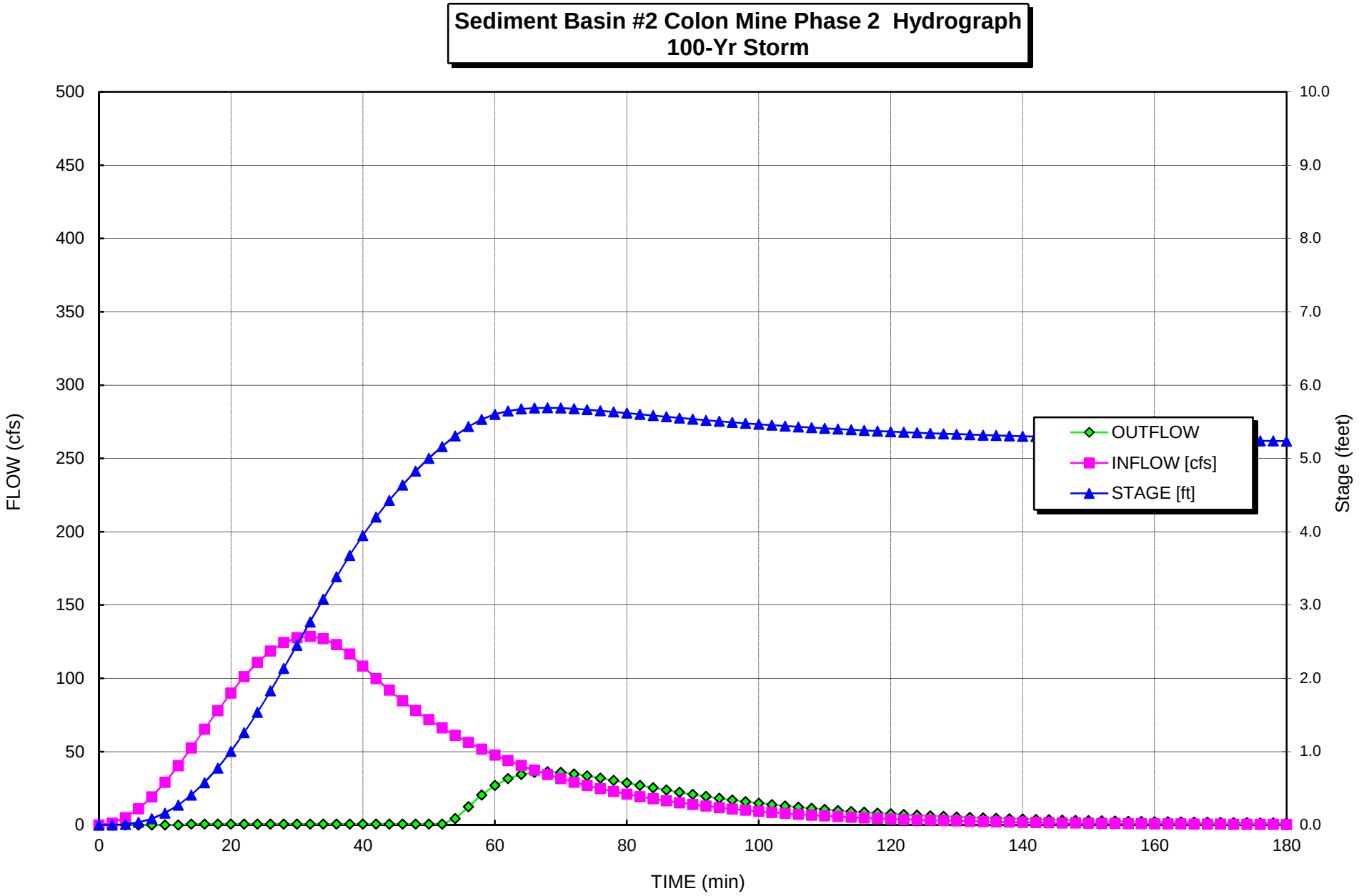
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
94%	Minimum Settling Efficiency		
5.7	ft Maximum Stage	264.7	msl elevation
36.2	cfs Peak outflow		
36.2	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	5.0	151	0.0	0.00	0.00	0.00	0.00	0.00	43.25	19,658	N/A
6	11.0	749	0.0	0.00	0.00	0.00	0.00	0.00	53.79	24,451	N/A
8	19.2	2,073	0.1	0.00	0.00	0.00	0.00	0.00	61.79	28,087	N/A
10	29.1	4,373	0.2	0.00	0.00	0.00	0.00	0.00	68.41	31,093	N/A
12	40.3	7,860	0.3	0.00	0.00	0.00	0.00	0.00	74.09	33,679	N/A
14	52.6	12,701	0.4	0.30	0.30	0.00	0.30	0.59	79.10	35,954	100%
16	65.2	18,937	0.6	0.30	0.30	0.00	0.30	0.59	83.52	37,965	100%
18	77.9	26,695	0.8	0.30	0.30	0.00	0.30	0.59	87.52	39,783	100%
20	90.0	35,969	1.0	0.30	0.30	0.00	0.30	0.59	91.15	41,432	100%
22	101.1	46,697	1.3	0.30	0.30	0.00	0.30	0.59	94.45	42,932	100%
24	110.8	58,757	1.5	0.30	0.30	0.00	0.30	0.59	97.45	44,296	100%
26	118.6	71,978	1.8	0.30	0.30	0.00	0.30	0.59	100.18	45,538	100%
28	124.3	86,141	2.1	0.30	0.30	0.00	0.30	0.59	102.67	46,666	100%
30	127.7	100,990	2.5	0.30	0.30	0.00	0.30	0.59	104.91	47,688	100%
32	128.6	116,245	2.8	0.30	0.30	0.00	0.30	0.59	106.94	48,611	100%
34	127.0	131,608	3.1	0.30	0.30	0.00	0.30	0.59	108.77	49,440	100%
36	122.9	146,777	3.4	0.30	0.30	0.00	0.30	0.59	110.40	50,180	100%
38	116.6	161,457	3.7	0.30	0.30	0.00	0.30	0.59	111.84	50,836	100%
40	108.3	175,373	3.9	0.30	0.30	0.00	0.30	0.59	113.10	51,411	100%
42	99.8	188,302	4.2	0.30	0.30	0.00	0.30	0.59	114.21	51,912	100%
44	91.9	200,207	4.4	0.30	0.30	0.00	0.30	0.59	115.16	52,347	100%
46	84.7	211,170	4.6	0.30	0.30	0.00	0.30	0.59	116.00	52,729	100%
48	78.0	221,264	4.8	0.30	0.30	0.00	0.30	0.59	116.74	53,065	100%
50	71.9	230,557	5.0	0.30	0.30	0.00	0.30	0.59	117.40	53,363	100%
52	66.2	239,114	5.2	0.30	0.30	0.00	0.30	0.59	117.98	53,629	100%
54	61.0	246,992	5.3	0.30	2.14	0.00	31.35	4.29	118.51	53,866	100%
56	56.2	253,800	5.4	0.30	6.18	0.00	31.80	12.37	118.95	54,066	99%
58	51.8	259,062	5.5	0.30	10.20	0.00	32.15	20.40	119.28	54,218	98%
60	47.7	262,830	5.6	0.30	13.47	0.00	32.40	26.93	119.51	54,324	96%
62	44.0	265,324	5.6	0.30	15.79	0.00	32.56	31.58	119.67	54,394	95%
64	40.5	266,810	5.7	0.30	17.23	0.00	32.65	34.46	119.76	54,436	94%
66	37.3	267,535	5.7	0.30	17.95	0.00	32.70	35.90	119.80	54,456	94%
68	34.4	267,705	5.7	0.30	18.12	0.00	32.71	36.24	119.81	54,461	94%
70	31.7	267,482	5.7	0.30	17.89	0.00	32.70	35.79	119.80	54,454	94%
72	29.2	266,988	5.7	0.30	17.40	0.00	32.66	34.81	119.77	54,441	94%
74	26.9	266,312	5.7	0.30	16.74	0.00	32.62	33.48	119.73	54,422	94%
76	24.8	265,519	5.7	0.30	15.98	0.00	32.57	31.95	119.68	54,400	95%
78	22.8	264,657	5.6	0.30	15.16	0.00	32.51	30.31	119.63	54,376	95%
80	21.0	263,757	5.6	0.30	14.32	0.00	32.46	28.63	119.57	54,350	96%
82	19.4	262,844	5.6	0.30	13.48	0.00	32.40	26.96	119.51	54,325	96%
84	17.8	261,933	5.6	0.30	12.66	0.00	32.34	25.32	119.46	54,299	96%

86	16.4	261,035	5.6	0.30	11.87	0.00	32.28	23.74	119.40	54,274	97%
88	15.1	260,158	5.6	0.30	11.12	0.00	32.22	22.24	119.35	54,249	97%
90	14.0	259,307	5.5	0.30	10.40	0.00	32.17	20.80	119.29	54,225	97%
92	12.9	258,485	5.5	0.30	9.73	0.00	32.11	19.45	119.24	54,201	98%
94	11.8	257,693	5.5	0.30	9.09	0.00	32.06	18.18	119.19	54,178	98%
96	10.9	256,932	5.5	0.30	8.49	0.00	32.01	16.98	119.14	54,157	98%
98	10.0	256,203	5.5	0.30	7.93	0.00	31.96	15.86	119.10	54,136	98%
100	9.3	255,505	5.5	0.30	7.41	0.00	31.92	14.82	119.05	54,116	99%
102	8.5	254,838	5.5	0.30	6.92	0.00	31.87	13.84	119.01	54,096	99%
104	7.9	254,201	5.4	0.30	6.46	0.00	31.83	12.93	118.97	54,078	99%
106	7.2	253,592	5.4	0.30	6.04	0.00	31.79	12.08	118.93	54,060	99%
108	6.7	253,012	5.4	0.30	5.64	0.00	31.75	11.29	118.90	54,043	99%
110	6.1	252,458	5.4	0.30	5.27	0.00	31.71	10.55	118.86	54,027	99%
112	5.7	251,930	5.4	0.30	4.93	0.00	31.68	9.86	118.83	54,012	99%
114	5.2	251,426	5.4	0.30	4.61	0.00	31.65	9.22	118.79	53,997	99%
116	4.8	250,946	5.4	0.30	4.31	0.00	31.61	8.62	118.76	53,983	99%
118	4.4	250,488	5.4	0.30	4.03	0.00	31.58	8.06	118.73	53,970	100%
120	4.1	250,052	5.4	0.30	3.77	0.00	31.55	7.55	118.70	53,957	100%
122	3.8	249,635	5.4	0.30	3.53	0.00	31.53	7.07	118.68	53,945	100%
124	3.5	249,238	5.4	0.30	3.31	0.00	31.50	6.62	118.65	53,933	100%
126	3.2	248,860	5.3	0.30	3.10	0.00	31.47	6.20	118.63	53,922	100%
128	2.9	248,499	5.3	0.30	2.90	0.00	31.45	5.81	118.60	53,911	100%
130	2.7	248,154	5.3	0.30	2.72	0.00	31.43	5.45	118.58	53,901	100%
132	2.5	247,825	5.3	0.30	2.55	0.00	31.40	5.11	118.56	53,891	100%
134	2.3	247,511	5.3	0.30	2.40	0.00	31.38	4.79	118.54	53,882	100%
136	2.1	247,212	5.3	0.30	2.25	0.00	31.36	4.50	118.52	53,873	100%
138	1.9	246,926	5.3	0.30	2.11	0.00	31.34	4.23	118.50	53,864	100%
140	1.8	246,652	5.3	0.30	1.99	0.00	31.33	3.97	118.48	53,856	100%
142	1.7	246,391	5.3	0.30	1.87	0.00	31.31	3.73	118.47	53,848	100%
144	1.5	246,142	5.3	0.30	1.76	0.00	31.29	3.51	118.45	53,841	100%
146	1.4	245,904	5.3	0.30	1.65	0.00	31.27	3.30	118.43	53,834	100%
148	1.3	245,676	5.3	0.30	1.56	0.00	31.26	3.11	118.42	53,827	100%
150	1.2	245,457	5.3	0.30	1.47	0.00	31.24	2.93	118.41	53,821	100%
152	1.1	245,249	5.3	0.30	1.38	0.00	31.23	2.76	118.39	53,814	100%
154	1.0	245,049	5.3	0.30	1.30	0.00	31.22	2.61	118.38	53,808	100%
156	0.9	244,858	5.3	0.30	1.23	0.00	31.20	2.46	118.37	53,803	100%
158	0.9	244,675	5.3	0.30	1.16	0.00	31.19	2.32	118.35	53,797	100%
160	0.8	244,499	5.3	0.30	1.10	0.00	31.18	2.19	118.34	53,792	100%
162	0.7	244,331	5.3	0.30	1.04	0.00	31.17	2.07	118.33	53,787	100%
164	0.7	244,169	5.3	0.30	0.98	0.00	31.16	1.96	118.32	53,782	100%
166	0.6	244,015	5.3	0.30	0.93	0.00	31.15	1.86	118.31	53,777	100%
168	0.6	243,866	5.3	0.30	0.88	0.00	31.14	1.76	118.30	53,773	100%
170	0.5	243,723	5.2	0.30	0.83	0.00	31.13	1.67	118.29	53,769	100%
172	0.5	243,586	5.2	0.30	0.79	0.00	31.12	1.58	118.28	53,765	100%
174	0.4	243,454	5.2	0.30	0.75	0.00	31.11	1.50	118.27	53,761	100%
176	0.4	243,327	5.2	0.30	0.71	0.00	31.10	1.43	118.26	53,757	100%
178	0.4	243,205	5.2	0.30	0.68	0.00	31.09	1.36	118.26	53,753	100%
180	0.3	243,087	5.2	0.30	0.65	0.00	31.08	1.29	118.25	53,750	100%
182	0.3	242,974	5.2	0.30	0.62	0.00	31.08	1.23	118.24	53,746	100%
184	0.3	242,865	5.2	0.30	0.59	0.00	31.07	1.17	118.23	53,743	100%
186	0.3	242,759	5.2	0.30	0.56	0.00	31.06	1.12	118.23	53,740	100%
188	0.3	242,657	5.2	0.30	0.54	0.00	31.05	1.07	118.22	53,737	100%
190	0.2	242,559	5.2	0.30	0.51	0.00	31.05	1.02	118.21	53,734	100%
192	0.2	242,464	5.2	0.30	0.49	0.00	31.04	0.98	118.21	53,731	100%
194	0.2	242,371	5.2	0.30	0.47	0.00	31.03	0.94	118.20	53,728	100%
196	0.2	242,282	5.2	0.30	0.45	0.00	31.03	0.90	118.20	53,725	100%
198	0.2	242,196	5.2	0.30	0.43	0.00	31.02	0.87	118.19	53,723	100%
200	0.2	242,112	5.2	0.30	0.42	0.00	31.02	0.83	118.18	53,720	100%
202	0.1	242,030	5.2	0.30	0.40	0.00	31.01	0.80	118.18	53,718	100%
204	0.1	241,951	5.2	0.30	0.39	0.00	31.01	0.77	118.17	53,715	100%


Sediment Basin #2 Colon Mine Phase 2 Hydrograph
100-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #3	Sheet: 1	Of: 4

Objective Design the temporary sediment basin to contain the 25-year storm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. NOAA Atlas 14, Volume 2, Version 3
4. VA Erosion and Sediment Control Handbook

Given

Phase	1	1		
Storm Event (yrs) =	10	25		
Total Drainage Area A (ac) =	3.1	3.1		
Disturbed Area (ac) =	3.1	3.1		
Curve Number CN =	91	91	Hydrographs	
Rainfall Depth P (in) =	5.28	6.28	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	20.57	24.96	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	5,580	cf
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	8,948	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
244	0	0	-	-	-
244	0	4,877	0	0	0
245	1	6,254	5,551	5,551	206
246	2	7,709	6,969	12,520	464
247	3	9,244	8,465	20,985	777
248	4	10,857	10,040	31,025	1,149
249	5	12,549	11,693	42,717	1,582
250	6	14,321	13,425	56,143	2,079

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 20,985 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 9,244 *Required Surface Area Achieved*

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #3	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	20,985		
Number of Skimmers	1		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	4,197		0.05 cfs
Selected Skimmer Size (inches) =	2.5		
Head on Skimmer (feet) =	0.208		
Diameter of Orifice (inches) =	2.0		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	1
Storm Event (yrs) =	10	25
S =	0.99	0.99
Runoff Depth Q* (inches) =	4.25	5.23
Time to Peak T_p (min) =	27.91	28.28

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	20,985
Z_2 (ft) =	6	S_2 (cf) =	56,143
b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ =	1.4		Ref 2, III-8
$K_S = S_2/Z_2^b$ =	4,411		

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #3	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor = 3.281 ft/sec per m/sec

Gravitational Acceleration, g (m/s^2) = 9.81

Specific Gravity of soil (s_s) = 2.6

Kinematic Viscosity of water (υ) = 1.14E-06 n^2 / sec @ 20° C — Ref 2, IV-11

Diameter of the Design Particle d_{15} = 40.00E-06 m

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / \upsilon] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 5.00

Set Top of Dam at (ft) = 6.00 — *See Hydrograph*

Anti-Seep Collar:

Anti-Seep Collar Size = 2 * Barrel Dia

Anti-Seep Collar Size (ft) = 2

Use Anti-Seep Collar Size (ft) = 2 x 2

Minimum Concrete Base for Riser:

Diameter of Riser (in) = 24 From Hydrograph

Avg Density of Concrete (lbs/cf) = 87.6

Density of Water (lbs/cf) = 62.4

Riser Displacement (cf) = 13.82 Pi * $(D_R/24)^2$ * Total Ht of Riser

Convert cf to cy = 27^{-1}

Min Concrete Needed (cy) = 0.36

Width & Length (ft) = 3

Thickness (ft) = 1.1

Anti-Vortex Device:

Diameter of Riser (in) = 24 From Hydrograph

Cylinder Diameter (in) = 36 — Ref 4, III-104, Table 3.14-D

Cylinder Thickness (gage) = 16

Cylinder Height (in) = 13

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #3	Sheet: 4	Of: 4

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	3	3 * Barrel Diameter
Q_B (cfs) =	4.1	Peak Flow out of the barrel 10-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
4.1	1.34	0.50	2.8	0.34	1.34	1.5

Flow Depth = Tailwater, d (ft) = 0.50 0.5* Barrel Diameter (ft) = 0.50 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
1	3	8	9	0.4	Class A

Conclusion

The temporary basin can contain the 25-yr storm.

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	24	
Circumference of Riser (in) =	75.4	
Height of Riser from bottom of barrel (in) =	53	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	1	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.05	0.05
0.29	0.00	0.00	0.00			0.05	0.05
0.34	0.00	0.00	0.00			0.05	0.05
0.39	0.00	0.00	0.00			0.05	0.05
0.44	0.00	0.00	0.00			0.05	0.05
0.49	0.00	0.00	0.00			0.05	0.05
0.54	0.00	0.00	0.00			0.05	0.05
0.59	0.00	0.00	0.00			0.05	0.05
0.64	0.00	0.00	0.00			0.05	0.05
0.69	0.00	0.00	0.00			0.05	0.05
0.74	0.00	0.00	0.00			0.05	0.05
0.79	0.00	0.00	0.00			0.05	0.05
0.84	0.00	0.00	0.00			0.05	0.05
0.89	0.00	0.00	0.00			0.05	0.05
0.94	0.00	0.00	0.00			0.05	0.05
0.99	0.00	0.00	0.00			0.05	0.05
1.04	0.00	0.00	0.00			0.05	0.05
1.09	0.00	0.00	0.00			0.05	0.05
1.14	0.00	0.00	0.00			0.05	0.05
1.19	0.00	0.00	0.00			0.05	0.05
1.24	0.00	0.00	0.00			0.05	0.05
1.29	0.00	0.00	0.00			0.05	0.05
1.34	0.00	0.00	0.00			0.05	0.05
1.39	0.00	0.00	0.00			0.05	0.05
1.44	0.00	0.00	0.00			0.05	0.05
1.49	0.00	0.00	0.00			0.05	0.05
1.54	0.00	0.00	0.00			0.05	0.05
1.59	0.00	0.00	0.00			0.05	0.05

1.64	0.00	0.00	0.00	0.05	0.05
1.69	0.00	0.00	0.00	0.05	0.05
1.74	0.00	0.00	0.00	0.05	0.05
1.79	0.00	0.00	0.00	0.05	0.05
1.84	0.00	0.00	0.00	0.05	0.05
1.89	0.00	0.00	0.00	0.05	0.05
1.94	0.00	0.00	0.00	0.05	0.05
1.99	0.00	0.00	0.00	0.05	0.05
2.04	0.00	0.00	0.00	0.05	0.05
2.09	0.00	0.00	0.00	0.05	0.05
2.14	0.00	0.00	0.00	0.05	0.05
2.19	0.00	0.00	0.00	0.05	0.05
2.24	0.00	0.00	0.00	0.05	0.05
2.29	0.00	0.00	0.00	0.05	0.05
2.34	0.00	0.00	0.00	0.05	0.05
2.39	0.00	0.00	0.00	0.05	0.05
2.44	0.00	0.00	0.00	0.05	0.05
2.49	0.00	0.00	0.00	0.05	0.05
2.54	0.00	0.00	0.00	0.05	0.05
2.59	0.00	0.00	0.00	0.05	0.05
2.64	0.00	0.00	0.00	0.05	0.05
2.69	0.00	0.00	0.00	0.05	0.05
2.74	0.00	0.00	0.00	0.05	0.05
2.79	0.00	0.00	0.00	0.05	0.05
2.84	0.00	0.00	0.00	0.05	0.05
2.89	0.00	0.00	0.00	0.05	0.05
2.94	0.00	0.00	0.00	0.05	0.05
2.99	0.00	0.00	0.00	0.05	0.05
3.04	0.00	0.00	0.00	0.05	0.05
3.09	0.00	0.00	0.00	0.05	0.05
3.14	0.00	0.00	0.00	0.05	0.05
3.19	0.00	0.00	0.00	0.05	0.05
3.24	0.00	0.00	0.00	0.05	0.05
3.29	0.00	0.00	0.00	0.05	0.05
3.34	0.00	0.00	0.00	0.05	0.05
3.39	0.00	0.00	0.00	0.05	0.05
3.44	0.00	0.00	0.00	0.05	0.05
3.49	0.00	0.00	0.00	0.05	0.05
3.54	0.00	0.00	0.00	0.05	0.05
3.59	0.00	0.00	0.00	0.05	0.05
3.64	0.00	0.00	0.00	0.05	0.05
3.69	0.00	0.00	0.00	0.05	0.05
3.74	0.00	0.00	0.00	0.05	0.05
3.79	0.00	0.00	0.00	0.05	0.05
3.84	0.00	0.00	0.00	0.05	0.05
3.89	0.00	0.00	0.00	0.05	0.05
3.94	0.00	0.00	0.00	0.05	0.05
3.99	0.00	0.00	0.00	0.05	0.05

Computed By: PAW Date: 3/05/15

Checked By: MDP Date: 3/06/15

Sheet: __1__of _2___

Qp = 20.57 cfs

Tp = 27.91 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 3 Colon

Phase 1

10 - year Storm Event

b = 1.4

K_s = 4,411

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	12	(in)	
Height of Riser above barrel =	3.4	(ft)	
Height of Riser from bottom of barrel=	4.4	(ft) elevation	248.40
Emergency Spillway =	5.0	(ft) elevation	249.00
Total Height of Dam =	6.0	(ft) elevation	250.00
Length of Emergency Spillway =	10	(ft)	
Diameter of Riser =	24	(in)	
Permanent Pond Stage =	0	(ft) elevation	244.0

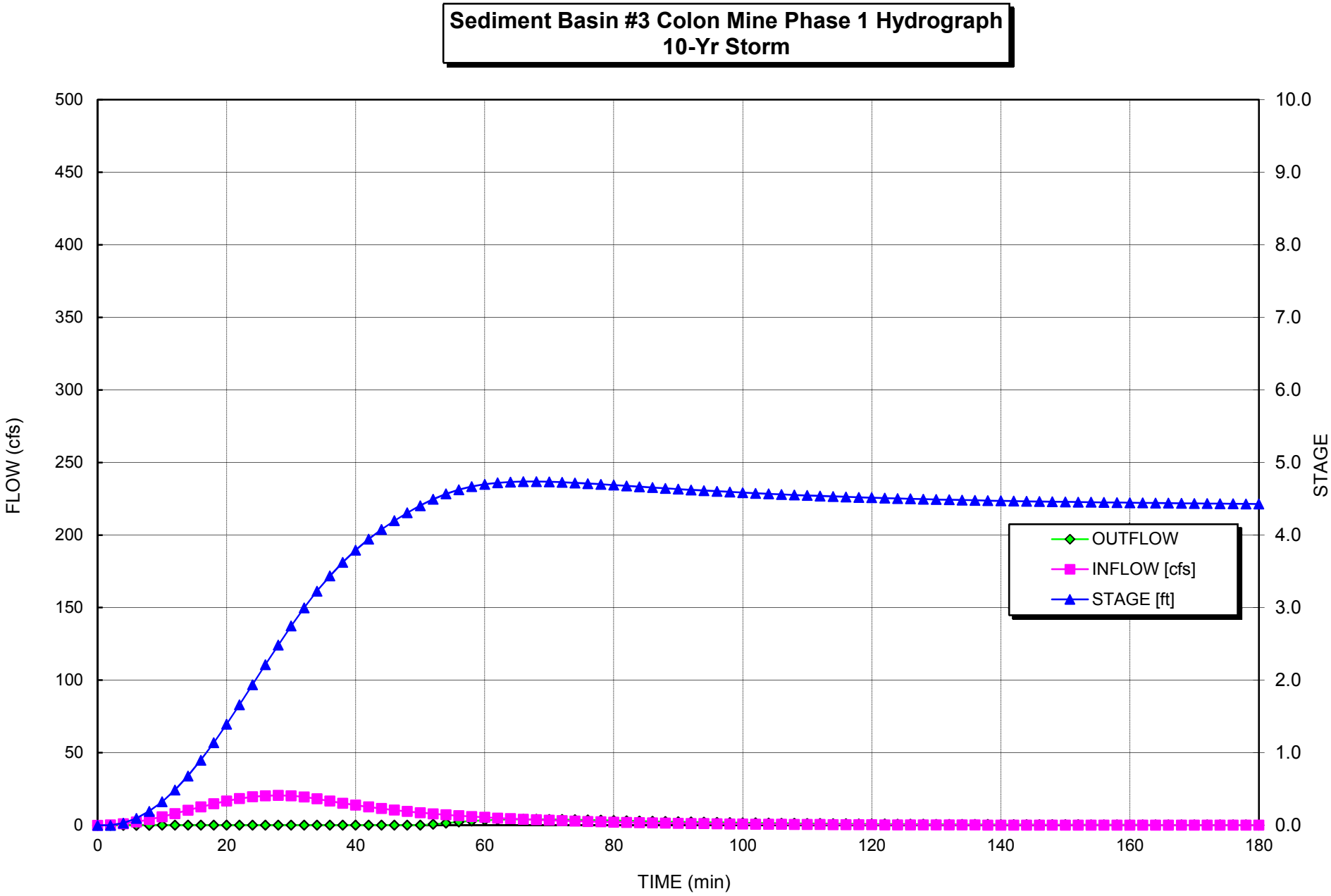
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
98%	Minimum Settling Efficiency		
4.7	ft Maximum Stage	248.74	msl elevation
4.1	cfs Peak outflow		
4.1	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	1.0	31	0.0	0.00	0.00	0.00	0.00	0.00	3.19	1,448	N/A
6	2.3	154	0.1	0.00	0.00	0.00	0.00	0.00	5.11	2,323	N/A
8	3.9	425	0.2	0.00	0.00	0.00	0.00	0.00	6.90	3,136	N/A
10	5.9	893	0.3	0.05	0.05	0.00	0.05	0.05	8.59	3,905	100%
12	8.0	1,590	0.5	0.05	0.05	0.00	0.05	0.05	10.19	4,631	100%
14	10.3	2,549	0.7	0.05	0.05	0.00	0.05	0.05	11.72	5,325	100%
16	12.6	3,784	0.9	0.05	0.05	0.00	0.05	0.05	13.17	5,985	100%
18	14.8	5,294	1.1	0.05	0.05	0.00	0.05	0.05	14.54	6,610	100%
20	16.8	7,066	1.4	0.05	0.05	0.00	0.05	0.05	15.84	7,198	100%
22	18.4	9,071	1.7	0.05	0.05	0.00	0.05	0.05	17.05	7,750	100%
24	19.6	11,271	1.9	0.05	0.05	0.00	0.05	0.05	18.18	8,264	100%
26	20.3	13,616	2.2	0.05	0.05	0.00	0.05	0.05	19.23	8,739	100%
28	20.6	16,050	2.5	0.05	0.05	0.00	0.05	0.05	20.18	9,174	100%
30	20.3	18,513	2.7	0.05	0.05	0.00	0.05	0.05	21.05	9,570	100%
32	19.5	20,941	3.0	0.05	0.05	0.00	0.05	0.05	21.83	9,925	100%
34	18.2	23,275	3.2	0.05	0.05	0.00	0.05	0.05	22.53	10,240	100%
36	16.7	25,458	3.4	0.05	0.05	0.00	0.05	0.05	23.13	10,515	100%
38	15.2	27,455	3.6	0.05	0.05	0.00	0.05	0.05	23.66	10,752	100%
40	13.9	29,273	3.8	0.05	0.05	0.00	0.05	0.05	24.11	10,958	100%
42	12.6	30,929	3.9	0.05	0.05	0.00	0.05	0.05	24.50	11,138	100%
44	11.5	32,438	4.1	0.05	0.05	0.00	0.05	0.05	24.85	11,296	100%
46	10.5	33,811	4.2	0.05	0.05	0.00	0.05	0.05	25.16	11,435	100%
48	9.5	35,062	4.3	0.05	0.05	0.00	0.05	0.05	25.43	11,559	100%
50	8.7	36,201	4.4	0.05	0.06	0.00	7.46	0.06	25.67	11,668	100%
52	7.9	37,238	4.5	0.05	0.64	0.00	7.54	0.64	25.89	11,766	100%
54	7.2	38,111	4.6	0.05	1.47	0.00	7.61	1.47	26.06	11,847	100%
56	6.6	38,801	4.6	0.05	2.27	0.00	7.67	2.27	26.20	11,910	99%
58	6.0	39,318	4.7	0.05	2.94	0.00	7.71	2.94	26.30	11,957	99%
60	5.5	39,684	4.7	0.05	3.44	0.00	7.74	3.44	26.38	11,990	98%
62	5.0	39,926	4.7	0.05	3.79	0.00	7.76	3.79	26.42	12,011	98%
64	4.5	40,068	4.7	0.05	4.00	0.00	7.77	4.00	26.45	12,024	98%
66	4.1	40,131	4.7	0.05	4.09	0.00	7.77	4.09	26.46	12,029	98%
68	3.8	40,135	4.7	0.05	4.10	0.00	7.77	4.10	26.47	12,030	98%
70	3.4	40,094	4.7	0.05	4.04	0.00	7.77	4.04	26.46	12,026	98%
72	3.1	40,020	4.7	0.05	3.93	0.00	7.76	3.93	26.44	12,020	98%
74	2.8	39,923	4.7	0.05	3.79	0.00	7.76	3.79	26.42	12,011	98%
76	2.6	39,810	4.7	0.05	3.62	0.00	7.75	3.62	26.40	12,001	98%
78	2.4	39,686	4.7	0.05	3.44	0.00	7.74	3.44	26.38	11,990	98%
80	2.1	39,556	4.7	0.05	3.26	0.00	7.73	3.26	26.35	11,978	99%
82	2.0	39,422	4.7	0.05	3.08	0.00	7.72	3.08	26.33	11,966	99%

84	1.8	39,288	4.7	0.05	2.89	0.00	7.71	2.89	26.30	11,954	99%
86	1.6	39,155	4.7	0.05	2.72	0.00	7.70	2.72	26.27	11,942	99%
88	1.5	39,023	4.6	0.05	2.55	0.00	7.69	2.55	26.25	11,930	99%
90	1.3	38,896	4.6	0.05	2.38	0.00	7.68	2.38	26.22	11,919	99%
92	1.2	38,771	4.6	0.05	2.23	0.00	7.67	2.23	26.20	11,907	99%
94	1.1	38,651	4.6	0.05	2.08	0.00	7.66	2.08	26.17	11,896	99%
96	1.0	38,536	4.6	0.05	1.94	0.00	7.65	1.94	26.15	11,886	99%
98	0.9	38,425	4.6	0.05	1.82	0.00	7.64	1.82	26.13	11,876	99%
100	0.8	38,318	4.6	0.05	1.69	0.00	7.63	1.69	26.11	11,866	100%
102	0.8	38,217	4.6	0.05	1.58	0.00	7.62	1.58	26.08	11,857	100%
104	0.7	38,119	4.6	0.05	1.48	0.00	7.62	1.48	26.07	11,848	100%
106	0.6	38,027	4.6	0.05	1.38	0.00	7.61	1.38	26.05	11,839	100%
108	0.6	37,938	4.6	0.05	1.28	0.00	7.60	1.28	26.03	11,831	100%
110	0.5	37,854	4.5	0.05	1.20	0.00	7.59	1.20	26.01	11,823	100%
112	0.5	37,774	4.5	0.05	1.12	0.00	7.59	1.12	26.00	11,816	100%
114	0.4	37,698	4.5	0.05	1.05	0.00	7.58	1.05	25.98	11,809	100%
116	0.4	37,625	4.5	0.05	0.98	0.00	7.58	0.98	25.96	11,802	100%
118	0.4	37,556	4.5	0.05	0.91	0.00	7.57	0.91	25.95	11,796	100%
120	0.3	37,490	4.5	0.05	0.85	0.00	7.57	0.85	25.94	11,790	100%
122	0.3	37,428	4.5	0.05	0.80	0.00	7.56	0.80	25.92	11,784	100%
124	0.3	37,369	4.5	0.05	0.75	0.00	7.56	0.75	25.91	11,778	100%
126	0.3	37,312	4.5	0.05	0.70	0.00	7.55	0.70	25.90	11,773	100%
128	0.2	37,258	4.5	0.05	0.66	0.00	7.55	0.66	25.89	11,768	100%
130	0.2	37,207	4.5	0.05	0.61	0.00	7.54	0.61	25.88	11,763	100%
132	0.2	37,159	4.5	0.05	0.58	0.00	7.54	0.58	25.87	11,759	100%
134	0.2	37,112	4.5	0.05	0.54	0.00	7.53	0.54	25.86	11,754	100%
136	0.2	37,068	4.5	0.05	0.51	0.00	7.53	0.51	25.85	11,750	100%
138	0.1	37,026	4.5	0.05	0.48	0.00	7.53	0.48	25.84	11,746	100%
140	0.1	36,987	4.5	0.05	0.45	0.00	7.52	0.45	25.83	11,743	100%
142	0.1	36,949	4.5	0.05	0.42	0.00	7.52	0.42	25.83	11,739	100%
144	0.1	36,912	4.5	0.05	0.40	0.00	7.52	0.40	25.82	11,736	100%
146	0.1	36,878	4.5	0.05	0.37	0.00	7.52	0.37	25.81	11,732	100%
148	0.1	36,845	4.5	0.05	0.35	0.00	7.51	0.35	25.80	11,729	100%
150	0.1	36,814	4.5	0.05	0.33	0.00	7.51	0.33	25.80	11,726	100%
152	0.1	36,784	4.5	0.05	0.31	0.00	7.51	0.31	25.79	11,724	100%
154	0.1	36,755	4.5	0.05	0.30	0.00	7.51	0.30	25.79	11,721	100%
156	0.1	36,728	4.4	0.05	0.28	0.00	7.50	0.28	25.78	11,718	100%
158	0.1	36,702	4.4	0.05	0.26	0.00	7.50	0.26	25.77	11,716	100%
160	0.1	36,677	4.4	0.05	0.25	0.00	7.50	0.25	25.77	11,714	100%
162	0.0	36,653	4.4	0.05	0.24	0.00	7.50	0.24	25.76	11,711	100%
164	0.0	36,631	4.4	0.05	0.22	0.00	7.50	0.22	25.76	11,709	100%
166	0.0	36,609	4.4	0.05	0.21	0.00	7.49	0.21	25.76	11,707	100%
168	0.0	36,588	4.4	0.05	0.20	0.00	7.49	0.20	25.75	11,705	100%
170	0.0	36,568	4.4	0.05	0.19	0.00	7.49	0.19	25.75	11,703	100%
172	0.0	36,549	4.4	0.05	0.18	0.00	7.49	0.18	25.74	11,701	100%
174	0.0	36,531	4.4	0.05	0.17	0.00	7.49	0.17	25.74	11,700	100%
176	0.0	36,513	4.4	0.05	0.16	0.00	7.49	0.16	25.74	11,698	100%
178	0.0	36,497	4.4	0.05	0.16	0.00	7.49	0.16	25.73	11,696	100%
180	0.0	36,481	4.4	0.05	0.15	0.00	7.48	0.15	25.73	11,695	100%
182	0.0	36,465	4.4	0.05	0.14	0.00	7.48	0.14	25.73	11,693	100%
184	0.0	36,450	4.4	0.05	0.14	0.00	7.48	0.14	25.72	11,692	100%
186	0.0	36,436	4.4	0.05	0.13	0.00	7.48	0.13	25.72	11,691	100%
188	0.0	36,422	4.4	0.05	0.12	0.00	7.48	0.12	25.72	11,689	100%
190	0.0	36,409	4.4	0.05	0.12	0.00	7.48	0.12	25.71	11,688	100%
192	0.0	36,396	4.4	0.05	0.11	0.00	7.48	0.11	25.71	11,687	100%
194	0.0	36,384	4.4	0.05	0.11	0.00	7.48	0.11	25.71	11,686	100%
196	0.0	36,372	4.4	0.05	0.10	0.00	7.47	0.10	25.71	11,685	100%
198	0.0	36,361	4.4	0.05	0.10	0.00	7.47	0.10	25.70	11,684	100%
200	0.0	36,350	4.4	0.05	0.10	0.00	7.47	0.10	25.70	11,683	100%
202	0.0	36,339	4.4	0.05	0.09	0.00	7.47	0.09	25.70	11,682	100%
204	0.0	36,329	4.4	0.05	0.09	0.00	7.47	0.09	25.70	11,681	100%
206	0.0	36,319	4.4	0.05	0.09	0.00	7.47	0.09	25.70	11,680	100%


Sediment Basin #3 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: __1__of _2___

Qp = 24.96 cfs

Tp = 28.28 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 3 Colon

Phase 1

25 - year Storm Event

b = 1.4

K_s = 4,411

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	12	(in)	
Height of Riser above barrel =	3.4	(ft)	
Height of Riser from bottom of barrel=	4.4	(ft) elevation	248.40
Emergency Spillway =	5.0	(ft) elevation	249.00
Total Height of Dam =	6.0	(ft) elevation	250.00
Length of Emergency Spillway =	10	(ft)	
Diameter of Riser =	24	(in)	
Permanent Pond Stage =	0	(ft) elevation	244.0

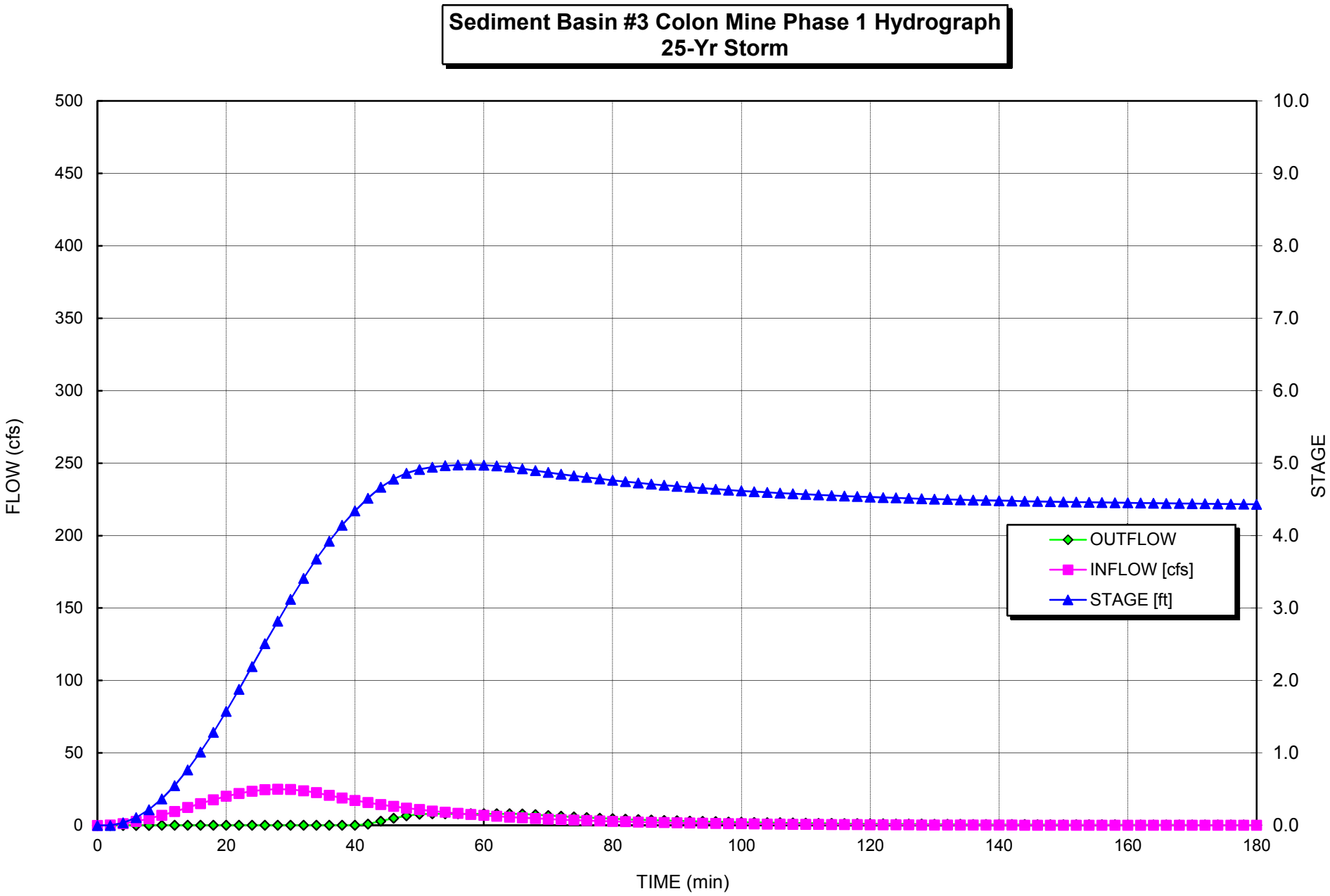
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
94%	Minimum Settling Efficiency		
5.0	ft Maximum Stage	248.98	msl elevation
8.0	cfs Peak outflow		
8.0	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	1.2	37	0.0	0.00	0.00	0.00	0.00	0.00	3.35	1,521	N/A
6	2.7	182	0.1	0.00	0.00	0.00	0.00	0.00	5.37	2,441	N/A
8	4.6	503	0.2	0.00	0.00	0.00	0.00	0.00	7.25	3,295	N/A
10	6.9	1,056	0.4	0.05	0.05	0.00	0.05	0.05	9.03	4,104	100%
12	9.5	1,883	0.5	0.05	0.05	0.00	0.05	0.05	10.71	4,869	100%
14	12.3	3,022	0.8	0.05	0.05	0.00	0.05	0.05	12.32	5,600	100%
16	15.0	4,491	1.0	0.05	0.05	0.00	0.05	0.05	13.85	6,296	100%
18	17.7	6,290	1.3	0.05	0.05	0.00	0.05	0.05	15.30	6,955	100%
20	20.0	8,404	1.6	0.05	0.05	0.00	0.05	0.05	16.67	7,577	100%
22	22.0	10,803	1.9	0.05	0.05	0.00	0.05	0.05	17.95	8,161	100%
24	23.6	13,443	2.2	0.05	0.05	0.00	0.05	0.05	19.15	8,706	100%
26	24.6	16,266	2.5	0.05	0.05	0.00	0.05	0.05	20.26	9,211	100%
28	25.0	19,208	2.8	0.05	0.05	0.00	0.05	0.05	21.28	9,675	100%
30	24.7	22,196	3.1	0.05	0.05	0.00	0.05	0.05	22.21	10,097	100%
32	23.9	25,158	3.4	0.05	0.05	0.00	0.05	0.05	23.05	10,478	100%
34	22.5	28,022	3.7	0.05	0.05	0.00	0.05	0.05	23.80	10,817	100%
36	20.7	30,719	3.9	0.05	0.05	0.00	0.05	0.05	24.45	11,115	100%
38	18.9	33,197	4.1	0.05	0.05	0.00	0.05	0.05	25.02	11,373	100%
40	17.2	35,458	4.3	0.05	0.05	0.00	0.05	0.05	25.51	11,597	100%
42	15.7	37,519	4.5	0.05	0.88	0.00	7.57	0.88	25.94	11,792	100%
44	14.3	39,299	4.7	0.05	2.91	0.00	7.71	2.91	26.30	11,955	99%
46	13.1	40,670	4.8	0.05	4.93	0.00	7.81	4.93	26.57	12,077	97%
48	11.9	41,648	4.9	0.05	6.55	0.00	7.89	6.55	26.76	12,162	96%
50	10.9	42,292	4.9	0.05	7.70	0.00	7.93	7.70	26.88	12,217	94%
52	9.9	42,673	4.9	0.05	8.41	0.00	7.96	7.96	26.95	12,250	94%
54	9.1	42,908	5.0	0.05	8.85	0.00	7.98	7.98	26.99	12,270	94%
56	8.3	43,037	5.0	0.05	9.10	0.00	7.99	7.99	27.02	12,281	94%
58	7.5	43,069	5.0	0.05	9.16	0.00	7.99	7.99	27.02	12,283	94%
60	6.9	43,014	5.0	0.05	9.06	0.00	7.99	7.99	27.01	12,279	94%
62	6.3	42,880	5.0	0.05	8.80	0.00	7.98	7.98	26.99	12,267	94%
64	5.7	42,675	4.9	0.05	8.41	0.00	7.96	7.96	26.95	12,250	94%
66	5.2	42,405	4.9	0.05	7.91	0.00	7.94	7.91	26.90	12,227	94%
68	4.8	42,082	4.9	0.05	7.32	0.00	7.92	7.32	26.84	12,199	95%
70	4.3	41,774	4.9	0.05	6.77	0.00	7.89	6.77	26.78	12,173	95%
72	4.0	41,481	4.8	0.05	6.27	0.00	7.87	6.27	26.72	12,148	96%
74	3.6	41,204	4.8	0.05	5.80	0.00	7.85	5.80	26.67	12,124	96%
76	3.3	40,941	4.8	0.05	5.36	0.00	7.83	5.36	26.62	12,101	97%
78	3.0	40,693	4.8	0.05	4.96	0.00	7.81	4.96	26.57	12,079	97%
80	2.7	40,457	4.8	0.05	4.59	0.00	7.80	4.59	26.53	12,058	97%
82	2.5	40,235	4.7	0.05	4.25	0.00	7.78	4.25	26.48	12,039	98%

84	2.3	40,025	4.7	0.05	3.94	0.00	7.76	3.94	26.44	12,020	98%
86	2.1	39,826	4.7	0.05	3.64	0.00	7.75	3.64	26.40	12,002	98%
88	1.9	39,638	4.7	0.05	3.38	0.00	7.73	3.38	26.37	11,985	98%
90	1.7	39,461	4.7	0.05	3.13	0.00	7.72	3.13	26.33	11,970	99%
92	1.6	39,293	4.7	0.05	2.90	0.00	7.71	2.90	26.30	11,955	99%
94	1.4	39,134	4.7	0.05	2.69	0.00	7.69	2.69	26.27	11,940	99%
96	1.3	38,984	4.6	0.05	2.50	0.00	7.68	2.50	26.24	11,927	99%
98	1.2	38,842	4.6	0.05	2.32	0.00	7.67	2.32	26.21	11,914	99%
100	1.1	38,708	4.6	0.05	2.15	0.00	7.66	2.15	26.18	11,902	99%
102	1.0	38,581	4.6	0.05	2.00	0.00	7.65	2.00	26.16	11,890	99%
104	0.9	38,460	4.6	0.05	1.86	0.00	7.64	1.86	26.13	11,879	99%
106	0.8	38,347	4.6	0.05	1.73	0.00	7.63	1.73	26.11	11,869	100%
108	0.8	38,239	4.6	0.05	1.61	0.00	7.62	1.61	26.09	11,859	100%
110	0.7	38,137	4.6	0.05	1.49	0.00	7.62	1.49	26.07	11,849	100%
112	0.6	38,041	4.6	0.05	1.39	0.00	7.61	1.39	26.05	11,841	100%
114	0.6	37,949	4.6	0.05	1.30	0.00	7.60	1.30	26.03	11,832	100%
116	0.5	37,863	4.5	0.05	1.21	0.00	7.59	1.21	26.01	11,824	100%
118	0.5	37,780	4.5	0.05	1.13	0.00	7.59	1.13	26.00	11,817	100%
120	0.4	37,703	4.5	0.05	1.05	0.00	7.58	1.05	25.98	11,809	100%
122	0.4	37,629	4.5	0.05	0.98	0.00	7.58	0.98	25.97	11,803	100%
124	0.4	37,559	4.5	0.05	0.92	0.00	7.57	0.92	25.95	11,796	100%
126	0.3	37,492	4.5	0.05	0.86	0.00	7.57	0.86	25.94	11,790	100%
128	0.3	37,429	4.5	0.05	0.80	0.00	7.56	0.80	25.92	11,784	100%
130	0.3	37,370	4.5	0.05	0.75	0.00	7.56	0.75	25.91	11,778	100%
132	0.3	37,313	4.5	0.05	0.70	0.00	7.55	0.70	25.90	11,773	100%
134	0.2	37,259	4.5	0.05	0.66	0.00	7.55	0.66	25.89	11,768	100%
136	0.2	37,208	4.5	0.05	0.61	0.00	7.54	0.61	25.88	11,763	100%
138	0.2	37,159	4.5	0.05	0.58	0.00	7.54	0.58	25.87	11,759	100%
140	0.2	37,113	4.5	0.05	0.54	0.00	7.53	0.54	25.86	11,754	100%
142	0.2	37,069	4.5	0.05	0.51	0.00	7.53	0.51	25.85	11,750	100%
144	0.1	37,027	4.5	0.05	0.48	0.00	7.53	0.48	25.84	11,746	100%
146	0.1	36,987	4.5	0.05	0.45	0.00	7.52	0.45	25.83	11,743	100%
148	0.1	36,949	4.5	0.05	0.42	0.00	7.52	0.42	25.83	11,739	100%
150	0.1	36,913	4.5	0.05	0.40	0.00	7.52	0.40	25.82	11,736	100%
152	0.1	36,878	4.5	0.05	0.37	0.00	7.52	0.37	25.81	11,732	100%
154	0.1	36,846	4.5	0.05	0.35	0.00	7.51	0.35	25.80	11,729	100%
156	0.1	36,814	4.5	0.05	0.33	0.00	7.51	0.33	25.80	11,726	100%
158	0.1	36,784	4.5	0.05	0.31	0.00	7.51	0.31	25.79	11,724	100%
160	0.1	36,756	4.5	0.05	0.30	0.00	7.51	0.30	25.79	11,721	100%
162	0.1	36,729	4.4	0.05	0.28	0.00	7.50	0.28	25.78	11,718	100%
164	0.1	36,703	4.4	0.05	0.26	0.00	7.50	0.26	25.78	11,716	100%
166	0.1	36,678	4.4	0.05	0.25	0.00	7.50	0.25	25.77	11,714	100%
168	0.0	36,654	4.4	0.05	0.24	0.00	7.50	0.24	25.76	11,711	100%
170	0.0	36,632	4.4	0.05	0.22	0.00	7.50	0.22	25.76	11,709	100%
172	0.0	36,610	4.4	0.05	0.21	0.00	7.49	0.21	25.76	11,707	100%
174	0.0	36,589	4.4	0.05	0.20	0.00	7.49	0.20	25.75	11,705	100%
176	0.0	36,569	4.4	0.05	0.19	0.00	7.49	0.19	25.75	11,703	100%
178	0.0	36,550	4.4	0.05	0.18	0.00	7.49	0.18	25.74	11,702	100%
180	0.0	36,532	4.4	0.05	0.17	0.00	7.49	0.17	25.74	11,700	100%
182	0.0	36,515	4.4	0.05	0.16	0.00	7.49	0.16	25.74	11,698	100%
184	0.0	36,498	4.4	0.05	0.16	0.00	7.49	0.16	25.73	11,697	100%
186	0.0	36,482	4.4	0.05	0.15	0.00	7.48	0.15	25.73	11,695	100%
188	0.0	36,466	4.4	0.05	0.14	0.00	7.48	0.14	25.73	11,694	100%
190	0.0	36,451	4.4	0.05	0.14	0.00	7.48	0.14	25.72	11,692	100%
192	0.0	36,437	4.4	0.05	0.13	0.00	7.48	0.13	25.72	11,691	100%
194	0.0	36,423	4.4	0.05	0.12	0.00	7.48	0.12	25.72	11,689	100%
196	0.0	36,410	4.4	0.05	0.12	0.00	7.48	0.12	25.71	11,688	100%
198	0.0	36,397	4.4	0.05	0.11	0.00	7.48	0.11	25.71	11,687	100%
200	0.0	36,385	4.4	0.05	0.11	0.00	7.48	0.11	25.71	11,686	100%
202	0.0	36,373	4.4	0.05	0.11	0.00	7.47	0.11	25.71	11,685	100%
204	0.0	36,362	4.4	0.05	0.10	0.00	7.47	0.10	25.70	11,684	100%
206	0.0	36,351	4.4	0.05	0.10	0.00	7.47	0.10	25.70	11,683	100%


Sediment Basin #3 Colon Mine Phase 1 Hydrograph
25-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #4	Sheet: 1	Of: 4

Objective Design the temporary sediment basin to contain the 25-year storm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. NOAA Atlas 14, Volume 2, Version 3
4. VA Erosion and Sediment Control Handbook

Given

Phase	1	1		
Storm Event (yrs) =	10	25		
Total Drainage Area A (ac) =	12.7	12.7		
Disturbed Area (ac) =	12.7	12.7		
Curve Number CN =	89	89	Hydrographs	
Rainfall Depth P (in) =	5.28	6.28	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	77.74	95.13	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	22,860	cf
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	41,382	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
261	0	26,486	0	0	0
262	1	29,254	27,859	27,859	1,032
263	2	32,108	30,670	58,528	2,168
264	3	35,046	33,566	92,095	3,411
265	4	38,057	36,541	128,636	4,764
266	5	41,127	39,582	168,218	6,230
267	6	44,258	42,683	210,901	7,811

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 92,095 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 35,046 *Increase Surface Area*

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #4	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	92,095		
Number of Skimmers	1		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	18,419		0.21 cfs
Selected Skimmer Size (inches) =	4		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	3.7		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) = $(P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) = $60.5(Q^*)A/Q_P/1.39$

Phase	1	1
Storm Event (yrs) =	10	25
S =	1.24	1.24
Runoff Depth Q* (inches) =	4.04	5.01
Time to Peak T_p (min) =	28.73	29.09

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #4	Sheet: 3	Of: 4

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) = 3 S_1 (cf)= 92,095

Z_2 (ft) = 5 S_2 (cf) = 168,218

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.2 Ref 2, III-8

$K_S = S_2/Z_2^{\,b}$ = 25,208

Determine Settling Velocity

Conversion Factor = 3.281 ft/sec per m/sec

Gravitational Acceleration, g (m/s^2) = 9.81

Specific Gravity of soil (s_s)= 2.6

Kinematic Viscosity of water (υ) = 1.14E-06 n^2 / sec @ 20° C Ref 2, IV-11

Diameter of the Design Particle d_{15} = 40.00E-06 m

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / \upsilon] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 6.00

Set Top of Dam at (ft) = 6.60 *See Hydrograph*

Anti-Seep Collar:

Anti-Seep Collar Size = 2 * Barrel Dia

Anti-Seep Collar Size (ft) = 2

Use Anti-Seep Collar Size (ft) = 2 x 2

Minimum Concrete Base for Riser:

Diameter of Riser (in) = 24 From Hydrograph

Avg Density of Concrete (lbs/cf) = 87.6

Density of Water (lbs/cf) = 62.4

Riser Displacement (cf) = 16.65 Pi * $(D_R/24)^2$ * Total Ht of Riser

Convert cf to cy = 27^{-1}

Min Concrete Needed (cy) = 0.44

Width & Length (ft) = 3

Thickness (ft) = 1.3

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #4	Sheet: 4	Of: 4

Anti-Vortex Device:

Diameter of Riser (in) = 24 From Hydrograph
Cylinder Diameter (in) = 36 Ref 4, III-104, Table 3.14-D
Cylinder Thickness (gage) = 16
Cylinder Height (in) = 13

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	3	3 * Barrel Diameter
Q_B (cfs) =	0.7	Peak Flow out of the barrel 10-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
0.7	0.24	0.20	0.8	0.16	0.24	0.9

Flow Depth = Tailwater, d (ft) = 0.20 0.5* Barrel Diameter (ft) = 0.50 Ref 1, 8.06.3
Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe
Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe
Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
1	3	8	9	0.4	Class A

Conclusion

The temporary basin can contain the 25-yr storm.

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet: 1	Of: 2

Diameter of Riser (in) = 24
Circumference of Riser (in) = 75.4
Height of Riser from bottom of barrel (in) = 64 From Hydrograph
Vertical spacing between holes (in) = 0 center to center
Water Stage increment (ft) 0.05

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge
C_d = 0.6 coefficient of discharge
A = sf, cross sectional area
g = 32.2 ft/sec^2, gravity
h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	1	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.21	0.21
0.39	0.00	0.00	0.00			0.21	0.21
0.44	0.00	0.00	0.00			0.21	0.21
0.49	0.00	0.00	0.00			0.21	0.21
0.54	0.00	0.00	0.00			0.21	0.21
0.59	0.00	0.00	0.00			0.21	0.21
0.64	0.00	0.00	0.00			0.21	0.21
0.69	0.00	0.00	0.00			0.21	0.21
0.74	0.00	0.00	0.00			0.21	0.21
0.79	0.00	0.00	0.00			0.21	0.21
0.84	0.00	0.00	0.00			0.21	0.21
0.89	0.00	0.00	0.00			0.21	0.21
0.94	0.00	0.00	0.00			0.21	0.21
0.99	0.00	0.00	0.00			0.21	0.21
1.04	0.00	0.00	0.00			0.21	0.21
1.09	0.00	0.00	0.00			0.21	0.21
1.14	0.00	0.00	0.00			0.21	0.21
1.19	0.00	0.00	0.00			0.21	0.21
1.24	0.00	0.00	0.00			0.21	0.21
1.29	0.00	0.00	0.00			0.21	0.21
1.34	0.00	0.00	0.00			0.21	0.21
1.39	0.00	0.00	0.00			0.21	0.21
1.44	0.00	0.00	0.00			0.21	0.21
1.49	0.00	0.00	0.00			0.21	0.21
1.54	0.00	0.00	0.00			0.21	0.21
1.59	0.00	0.00	0.00			0.21	0.21

1.64	0.00	0.00	0.00	0.21	0.21
1.69	0.00	0.00	0.00	0.21	0.21
1.74	0.00	0.00	0.00	0.21	0.21
1.79	0.00	0.00	0.00	0.21	0.21
1.84	0.00	0.00	0.00	0.21	0.21
1.89	0.00	0.00	0.00	0.21	0.21
1.94	0.00	0.00	0.00	0.21	0.21
1.99	0.00	0.00	0.00	0.21	0.21
2.04	0.00	0.00	0.00	0.21	0.21
2.09	0.00	0.00	0.00	0.21	0.21
2.14	0.00	0.00	0.00	0.21	0.21
2.19	0.00	0.00	0.00	0.21	0.21
2.24	0.00	0.00	0.00	0.21	0.21
2.29	0.00	0.00	0.00	0.21	0.21
2.34	0.00	0.00	0.00	0.21	0.21
2.39	0.00	0.00	0.00	0.21	0.21
2.44	0.00	0.00	0.00	0.21	0.21
2.49	0.00	0.00	0.00	0.21	0.21
2.54	0.00	0.00	0.00	0.21	0.21
2.59	0.00	0.00	0.00	0.21	0.21
2.64	0.00	0.00	0.00	0.21	0.21
2.69	0.00	0.00	0.00	0.21	0.21
2.74	0.00	0.00	0.00	0.21	0.21
2.79	0.00	0.00	0.00	0.21	0.21
2.84	0.00	0.00	0.00	0.21	0.21
2.89	0.00	0.00	0.00	0.21	0.21
2.94	0.00	0.00	0.00	0.21	0.21
2.99	0.00	0.00	0.00	0.21	0.21
3.04	0.00	0.00	0.00	0.21	0.21
3.09	0.00	0.00	0.00	0.21	0.21
3.14	0.00	0.00	0.00	0.21	0.21
3.19	0.00	0.00	0.00	0.21	0.21
3.24	0.00	0.00	0.00	0.21	0.21
3.29	0.00	0.00	0.00	0.21	0.21
3.34	0.00	0.00	0.00	0.21	0.21
3.39	0.00	0.00	0.00	0.21	0.21
3.44	0.00	0.00	0.00	0.21	0.21
3.49	0.00	0.00	0.00	0.21	0.21
3.54	0.00	0.00	0.00	0.21	0.21
3.59	0.00	0.00	0.00	0.21	0.21
3.64	0.00	0.00	0.00	0.21	0.21
3.69	0.00	0.00	0.00	0.21	0.21
3.74	0.00	0.00	0.00	0.21	0.21
3.79	0.00	0.00	0.00	0.21	0.21
3.84	0.00	0.00	0.00	0.21	0.21
3.89	0.00	0.00	0.00	0.21	0.21
3.94	0.00	0.00	0.00	0.21	0.21
3.99	0.00	0.00	0.00	0.21	0.21

Computed By: PAW Date: 3/05/15

Checked By: MDP Date: 3/0615

Sheet: __1_of __2_

Qp = 77.74 cfs

Tp = 28.73 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 4 Colon

Phase 1

10 - year Storm Event

b = 1.2

K_s = 25,208

Number of Riser/Barrel Assemblies	1			
Diameter of Barrel =	12	(in)		
Height of Riser above barrel =	4.3	(ft)		
Height of Riser from bottom of barrel=	5.3	(ft) elevation	266.30	
Emergency Spillway =	6.0	(ft) elevation	267.00	
Total Height of Dam =	6.6	(ft) elevation	267.60	
Length of Emergency Spillway =	20	(ft)		
Diameter of Riser =	24	(in)		
Permanent Pond Stage =	0	(ft) elevation	261.0	

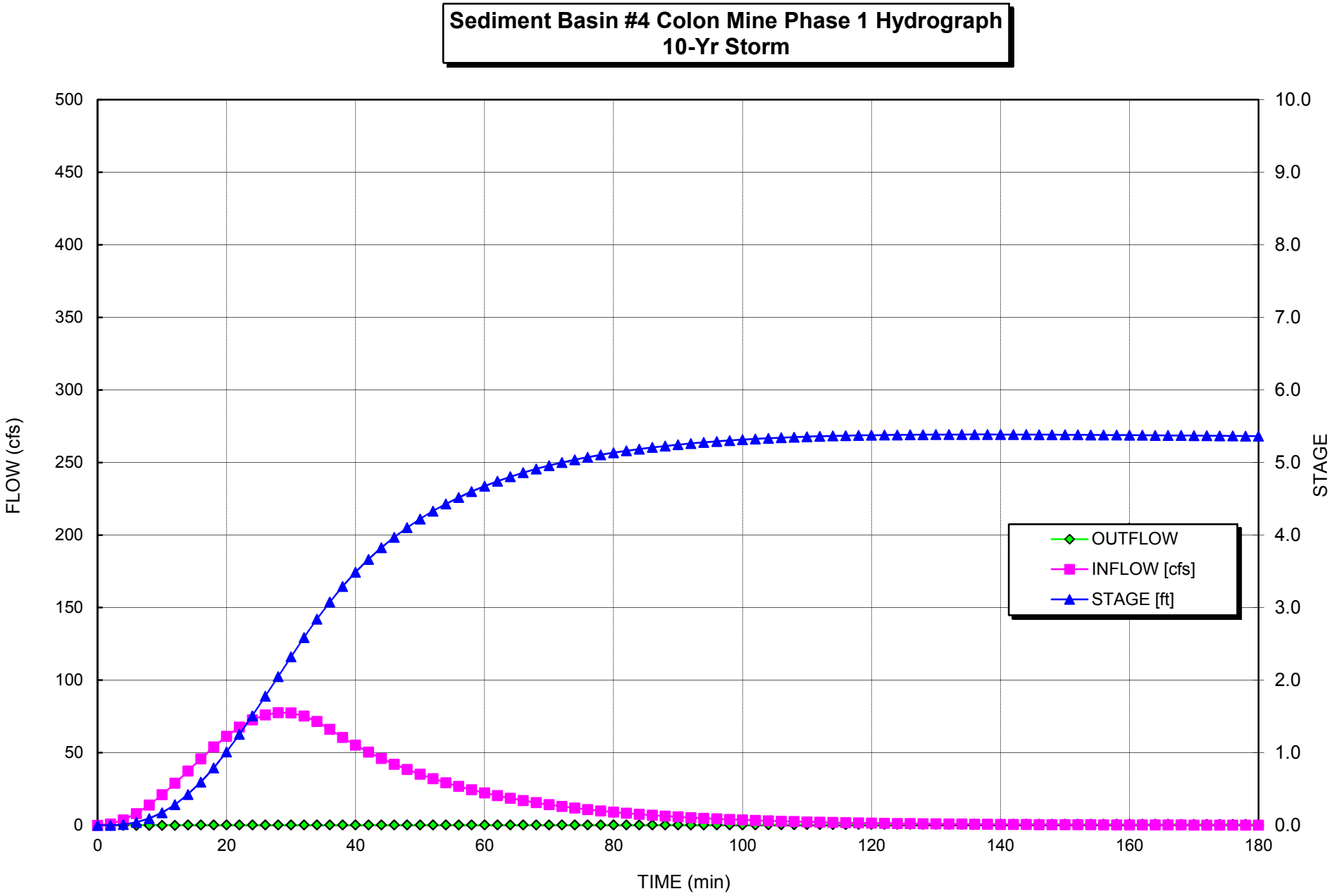
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.4	ft Maximum Stage	266.39	msl elevation
0.7	cfs Peak outflow		
0.7	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.9	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	3.7	111	0.0	0.00	0.00	0.00	0.00	0.00	28.66	13,029	N/A
6	8.1	550	0.0	0.00	0.00	0.00	0.00	0.00	36.56	16,618	N/A
8	13.9	1,519	0.1	0.00	0.00	0.00	0.00	0.00	42.66	19,393	N/A
10	21.0	3,192	0.2	0.00	0.00	0.00	0.00	0.00	47.77	21,712	N/A
12	28.9	5,714	0.3	0.00	0.00	0.00	0.00	0.00	52.19	23,722	N/A
14	37.3	9,185	0.4	0.21	0.21	0.00	0.21	0.21	56.10	25,498	100%
16	45.8	13,638	0.6	0.21	0.21	0.00	0.21	0.21	59.57	27,078	100%
18	53.9	19,106	0.8	0.21	0.21	0.00	0.21	0.21	62.71	28,502	100%
20	61.3	25,551	1.0	0.21	0.21	0.00	0.21	0.21	65.54	29,790	100%
22	67.7	32,885	1.3	0.21	0.21	0.00	0.21	0.21	68.10	30,956	100%
24	72.7	40,981	1.5	0.21	0.21	0.00	0.21	0.21	70.42	32,010	100%
26	76.0	49,674	1.8	0.21	0.21	0.00	0.21	0.21	72.51	32,960	100%
28	77.6	58,771	2.0	0.21	0.21	0.00	0.21	0.21	74.39	33,814	100%
30	77.4	68,060	2.3	0.21	0.21	0.00	0.21	0.21	76.07	34,577	100%
32	75.3	77,318	2.6	0.21	0.21	0.00	0.21	0.21	77.56	35,254	100%
34	71.5	86,326	2.8	0.21	0.21	0.00	0.21	0.21	78.87	35,850	100%
36	66.2	94,876	3.1	0.21	0.21	0.00	0.21	0.21	80.01	36,368	100%
38	60.4	102,791	3.3	0.21	0.21	0.00	0.21	0.21	80.99	36,814	100%
40	55.2	110,020	3.5	0.21	0.21	0.00	0.21	0.21	81.83	37,197	100%
42	50.4	116,620	3.7	0.21	0.21	0.00	0.21	0.21	82.56	37,528	100%
44	46.1	122,648	3.8	0.21	0.21	0.00	0.21	0.21	83.20	37,816	100%
46	42.1	128,151	4.0	0.21	0.21	0.00	0.21	0.21	83.75	38,070	100%
48	38.4	133,177	4.1	0.21	0.21	0.00	0.21	0.21	84.24	38,293	100%
50	35.1	137,765	4.2	0.21	0.21	0.00	0.21	0.21	84.68	38,491	100%
52	32.1	141,954	4.3	0.21	0.21	0.00	0.21	0.21	85.07	38,666	100%
54	29.3	145,778	4.4	0.21	0.21	0.00	0.21	0.21	85.41	38,823	100%
56	26.8	149,269	4.5	0.21	0.21	0.00	0.21	0.21	85.72	38,963	100%
58	24.5	152,456	4.6	0.21	0.21	0.00	0.21	0.21	85.99	39,088	100%
60	22.3	155,365	4.7	0.21	0.21	0.00	0.21	0.21	86.24	39,201	100%
62	20.4	158,020	4.7	0.21	0.21	0.00	0.21	0.21	86.46	39,302	100%
64	18.6	160,444	4.8	0.21	0.21	0.00	0.21	0.21	86.66	39,393	100%
66	17.0	162,655	4.9	0.21	0.21	0.00	0.21	0.21	86.85	39,475	100%
68	15.6	164,673	4.9	0.21	0.21	0.00	0.21	0.21	87.01	39,549	100%
70	14.2	166,514	5.0	0.21	0.21	0.00	0.21	0.21	87.16	39,616	100%
72	13.0	168,193	5.0	0.21	0.21	0.00	0.21	0.21	87.29	39,677	100%
74	11.9	169,725	5.0	0.21	0.21	0.00	0.21	0.21	87.41	39,731	100%
76	10.8	171,122	5.1	0.21	0.21	0.00	0.21	0.21	87.52	39,781	100%
78	9.9	172,396	5.1	0.21	0.21	0.00	0.21	0.21	87.62	39,826	100%
80	9.0	173,558	5.1	0.21	0.21	0.00	0.21	0.21	87.71	39,867	100%
82	8.3	174,617	5.2	0.21	0.21	0.00	0.21	0.21	87.79	39,904	100%

84	7.5	175,582	5.2	0.21	0.21	0.00	0.21	0.21	87.86	39,937	100%
86	6.9	176,461	5.2	0.21	0.21	0.00	0.21	0.21	87.93	39,967	100%
88	6.3	177,262	5.2	0.21	0.21	0.00	0.21	0.21	87.99	39,995	100%
90	5.7	177,992	5.2	0.21	0.21	0.00	0.21	0.21	88.04	40,020	100%
92	5.3	178,656	5.3	0.21	0.21	0.00	0.21	0.21	88.09	40,043	100%
94	4.8	179,260	5.3	0.21	0.21	0.00	0.21	0.21	88.14	40,063	100%
96	4.4	179,810	5.3	0.21	0.21	0.00	0.21	0.21	88.18	40,082	100%
98	4.0	180,311	5.3	0.21	0.22	0.00	8.27	0.22	88.22	40,099	100%
100	3.7	180,765	5.3	0.21	0.25	0.00	8.28	0.25	88.25	40,114	100%
102	3.3	181,174	5.3	0.21	0.29	0.00	8.29	0.29	88.28	40,128	100%
104	3.1	181,539	5.3	0.21	0.34	0.00	8.30	0.34	88.31	40,140	100%
106	2.8	181,864	5.3	0.21	0.39	0.00	8.31	0.39	88.33	40,151	100%
108	2.5	182,152	5.3	0.21	0.44	0.00	8.31	0.44	88.35	40,161	100%
110	2.3	182,405	5.4	0.21	0.48	0.00	8.32	0.48	88.37	40,169	100%
112	2.1	182,626	5.4	0.21	0.52	0.00	8.32	0.52	88.39	40,177	100%
114	1.9	182,818	5.4	0.21	0.56	0.00	8.33	0.56	88.40	40,183	100%
116	1.8	182,983	5.4	0.21	0.59	0.00	8.33	0.59	88.41	40,189	100%
118	1.6	183,125	5.4	0.21	0.62	0.00	8.33	0.62	88.43	40,193	100%
120	1.5	183,244	5.4	0.21	0.65	0.00	8.34	0.65	88.43	40,197	100%
122	1.4	183,343	5.4	0.21	0.67	0.00	8.34	0.67	88.44	40,201	100%
124	1.2	183,425	5.4	0.21	0.69	0.00	8.34	0.69	88.45	40,203	100%
126	1.1	183,491	5.4	0.21	0.70	0.00	8.34	0.70	88.45	40,205	100%
128	1.0	183,541	5.4	0.21	0.71	0.00	8.34	0.71	88.46	40,207	100%
130	0.9	183,579	5.4	0.21	0.72	0.00	8.34	0.72	88.46	40,208	100%
132	0.9	183,605	5.4	0.21	0.73	0.00	8.35	0.73	88.46	40,209	100%
134	0.8	183,621	5.4	0.21	0.73	0.00	8.35	0.73	88.46	40,210	100%
136	0.7	183,627	5.4	0.21	0.73	0.00	8.35	0.73	88.46	40,210	100%
138	0.7	183,625	5.4	0.21	0.73	0.00	8.35	0.73	88.46	40,210	100%
140	0.6	183,616	5.4	0.21	0.73	0.00	8.35	0.73	88.46	40,210	100%
142	0.5	183,600	5.4	0.21	0.73	0.00	8.35	0.73	88.46	40,209	100%
144	0.5	183,578	5.4	0.21	0.72	0.00	8.34	0.72	88.46	40,208	100%
146	0.5	183,552	5.4	0.21	0.72	0.00	8.34	0.72	88.46	40,207	100%
148	0.4	183,520	5.4	0.21	0.71	0.00	8.34	0.71	88.45	40,206	100%
150	0.4	183,485	5.4	0.21	0.70	0.00	8.34	0.70	88.45	40,205	100%
152	0.3	183,447	5.4	0.21	0.69	0.00	8.34	0.69	88.45	40,204	100%
154	0.3	183,405	5.4	0.21	0.68	0.00	8.34	0.68	88.45	40,203	100%
156	0.3	183,361	5.4	0.21	0.67	0.00	8.34	0.67	88.44	40,201	100%
158	0.3	183,315	5.4	0.21	0.66	0.00	8.34	0.66	88.44	40,200	100%
160	0.2	183,267	5.4	0.21	0.65	0.00	8.34	0.65	88.44	40,198	100%
162	0.2	183,217	5.4	0.21	0.64	0.00	8.34	0.64	88.43	40,196	100%
164	0.2	183,167	5.4	0.21	0.63	0.00	8.34	0.63	88.43	40,195	100%
166	0.2	183,115	5.4	0.21	0.62	0.00	8.33	0.62	88.42	40,193	100%
168	0.2	183,062	5.4	0.21	0.61	0.00	8.33	0.61	88.42	40,191	100%
170	0.2	183,009	5.4	0.21	0.60	0.00	8.33	0.60	88.42	40,189	100%
172	0.1	182,956	5.4	0.21	0.59	0.00	8.33	0.59	88.41	40,188	100%
174	0.1	182,902	5.4	0.21	0.58	0.00	8.33	0.58	88.41	40,186	100%
176	0.1	182,848	5.4	0.21	0.57	0.00	8.33	0.57	88.40	40,184	100%
178	0.1	182,794	5.4	0.21	0.56	0.00	8.33	0.56	88.40	40,182	100%
180	0.1	182,740	5.4	0.21	0.55	0.00	8.33	0.55	88.40	40,180	100%
182	0.1	182,686	5.4	0.21	0.54	0.00	8.33	0.54	88.39	40,179	100%
184	0.1	182,633	5.4	0.21	0.53	0.00	8.32	0.53	88.39	40,177	100%
186	0.1	182,579	5.4	0.21	0.52	0.00	8.32	0.52	88.39	40,175	100%
188	0.1	182,526	5.4	0.21	0.51	0.00	8.32	0.51	88.38	40,173	100%
190	0.1	182,474	5.4	0.21	0.50	0.00	8.32	0.50	88.38	40,172	100%
192	0.1	182,422	5.4	0.21	0.49	0.00	8.32	0.49	88.37	40,170	100%
194	0.1	182,370	5.4	0.21	0.48	0.00	8.32	0.48	88.37	40,168	100%
196	0.0	182,319	5.4	0.21	0.47	0.00	8.32	0.47	88.37	40,166	100%
198	0.0	182,269	5.4	0.21	0.46	0.00	8.32	0.46	88.36	40,165	100%
200	0.0	182,219	5.4	0.21	0.45	0.00	8.32	0.45	88.36	40,163	100%
202	0.0	182,170	5.3	0.21	0.44	0.00	8.31	0.44	88.35	40,161	100%
204	0.0	182,121	5.3	0.21	0.43	0.00	8.31	0.43	88.35	40,160	100%
206	0.0	182,073	5.3	0.21	0.42	0.00	8.31	0.42	88.35	40,158	100%


Sediment Basin #4 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

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Computed By: PAW Date: 3/05/15

Checked By: MDP Date: 3/0615

Sheet: __1_of __2_

Qp = 95.13 cfs

Tp = 29.09 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 4 Colon

Phase 1

25 - year Storm Event

b = 1.2

K_s = 25,208

Number of Riser/Barrel Assemblies	1			
Diameter of Barrel =	12	(in)		
Height of Riser above barrel =	4.3	(ft)		
Height of Riser from bottom of barrel=	5.3	(ft) elevation	266.30	
Emergency Spillway =	6	(ft) elevation	267.00	
Total Height of Dam =	6.6	(ft) elevation	267.60	
Length of Emergency Spillway =	20	(ft)		
Diameter of Riser =	24	(in)		
Permanent Pond Stage =	0	(ft) elevation	261.0	

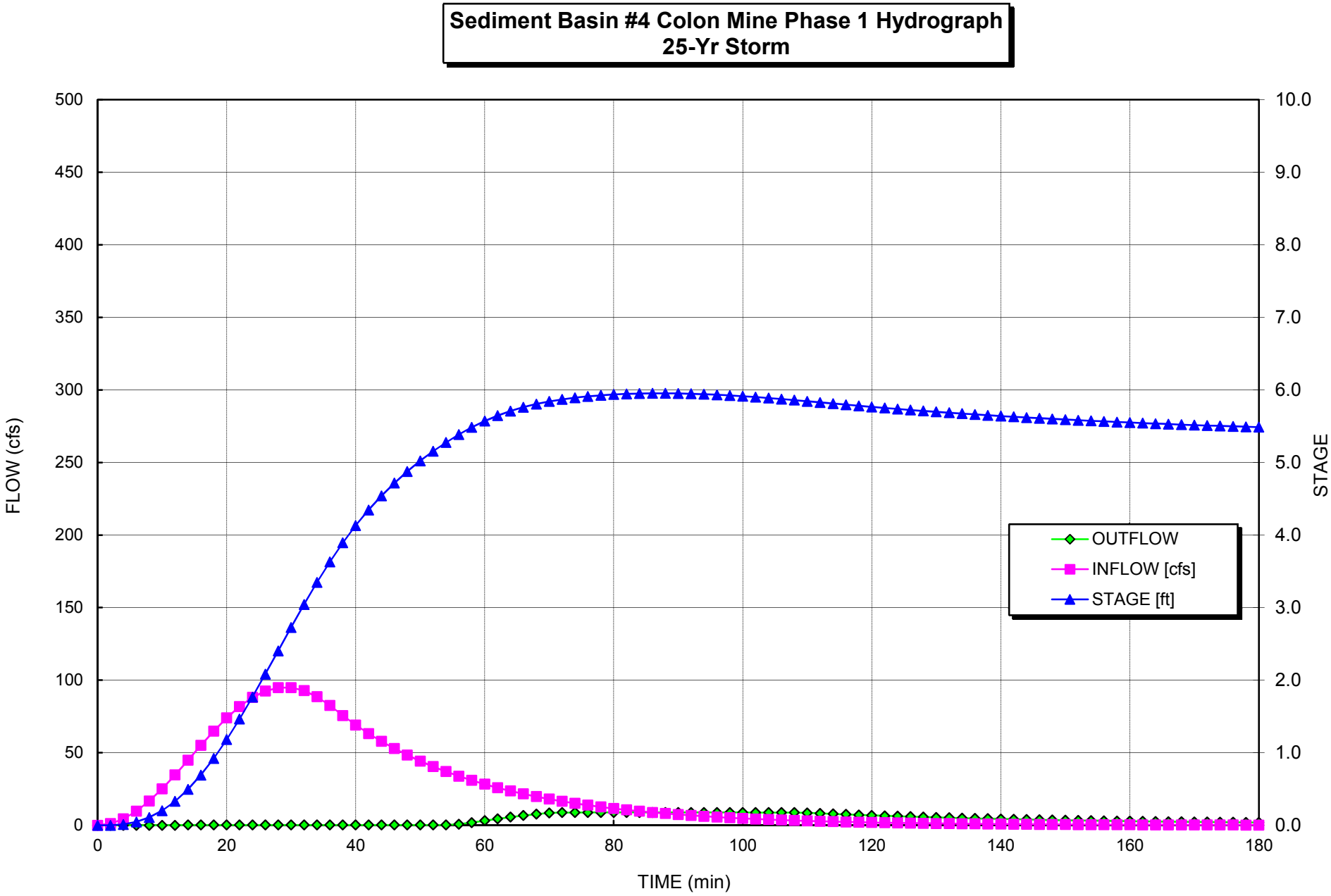
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
99%	Minimum Settling Efficiency		
6.0	ft Maximum Stage	266.95	msl elevation
8.8	cfs Peak outflow		
8.8	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.1	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	4.4	133	0.0	0.00	0.00	0.00	0.00	0.00	29.45	13,384	N/A
6	9.6	657	0.0	0.00	0.00	0.00	0.00	0.00	37.56	17,072	N/A
8	16.7	1,813	0.1	0.00	0.00	0.00	0.00	0.00	43.83	19,923	N/A
10	25.1	3,814	0.2	0.00	0.00	0.00	0.00	0.00	49.08	22,308	N/A
12	34.6	6,830	0.3	0.00	0.00	0.00	0.00	0.00	53.62	24,375	N/A
14	44.8	10,988	0.5	0.21	0.21	0.00	0.21	0.21	57.65	26,203	100%
16	55.0	16,333	0.7	0.21	0.21	0.00	0.21	0.21	61.23	27,831	100%
18	64.9	22,907	0.9	0.21	0.21	0.00	0.21	0.21	64.46	29,300	100%
20	74.0	30,669	1.2	0.21	0.21	0.00	0.21	0.21	67.38	30,629	100%
22	81.8	39,521	1.5	0.21	0.21	0.00	0.21	0.21	70.03	31,833	100%
24	88.1	49,317	1.8	0.21	0.21	0.00	0.21	0.21	72.43	32,924	100%
26	92.5	59,865	2.1	0.21	0.21	0.00	0.21	0.21	74.60	33,909	100%
28	94.8	70,939	2.4	0.21	0.21	0.00	0.21	0.21	76.55	34,795	100%
30	94.9	82,289	2.7	0.21	0.21	0.00	0.21	0.21	78.30	35,589	100%
32	92.8	93,652	3.0	0.21	0.21	0.00	0.21	0.21	79.85	36,296	100%
34	88.6	104,763	3.3	0.21	0.21	0.00	0.21	0.21	81.23	36,921	100%
36	82.5	115,371	3.6	0.21	0.21	0.00	0.21	0.21	82.43	37,466	100%
38	75.6	125,246	3.9	0.21	0.21	0.00	0.21	0.21	83.46	37,937	100%
40	69.1	134,290	4.1	0.21	0.21	0.00	0.21	0.21	84.35	38,341	100%
42	63.2	142,559	4.3	0.21	0.21	0.00	0.21	0.21	85.12	38,691	100%
44	57.8	150,118	4.5	0.21	0.21	0.00	0.21	0.21	85.79	38,997	100%
46	52.9	157,029	4.7	0.21	0.21	0.00	0.21	0.21	86.38	39,264	100%
48	48.3	163,348	4.9	0.21	0.21	0.00	0.21	0.21	86.90	39,501	100%
50	44.2	169,123	5.0	0.21	0.21	0.00	0.21	0.21	87.36	39,710	100%
52	40.4	174,403	5.2	0.21	0.21	0.00	0.21	0.21	87.77	39,896	100%
54	37.0	179,229	5.3	0.21	0.21	0.00	0.21	0.21	88.14	40,062	100%
56	33.8	183,641	5.4	0.21	0.74	0.00	8.35	0.74	88.46	40,210	100%
58	30.9	187,610	5.5	0.21	1.86	0.00	8.43	1.86	88.75	40,341	100%
60	28.3	191,098	5.6	0.21	3.14	0.00	8.50	3.14	89.00	40,455	100%
62	25.9	194,115	5.6	0.21	4.42	0.00	8.56	4.42	89.21	40,551	100%
64	23.7	196,688	5.7	0.21	5.63	0.00	8.62	5.63	89.39	40,632	100%
66	21.6	198,850	5.8	0.21	6.72	0.00	8.66	6.72	89.54	40,700	99%
68	19.8	200,639	5.8	0.21	7.67	0.00	8.70	7.67	89.66	40,755	99%
70	18.1	202,091	5.8	0.21	8.48	0.00	8.73	8.48	89.76	40,800	99%
72	16.5	203,245	5.9	0.21	9.13	0.00	8.75	8.75	89.84	40,836	99%
74	15.1	204,180	5.9	0.21	9.67	0.00	8.77	8.77	89.90	40,864	99%
76	13.8	204,944	5.9	0.21	10.13	0.00	8.78	8.78	89.95	40,887	99%
78	12.7	205,550	5.9	0.21	10.49	0.00	8.80	8.80	89.99	40,906	99%
80	11.6	206,013	5.9	0.21	10.77	0.00	8.80	8.80	90.02	40,920	99%
82	10.6	206,345	5.9	0.21	10.97	0.00	8.81	8.81	90.05	40,930	99%

84	9.7	206,557	6.0	0.21	11.10	0.00	8.82	8.82	90.06	40,936	99%
86	8.9	206,661	6.0	0.21	11.16	0.00	8.82	8.82	90.07	40,939	99%
88	8.1	206,665	6.0	0.21	11.17	0.00	8.82	8.82	90.07	40,939	99%
90	7.4	206,578	6.0	0.21	11.11	0.00	8.82	8.82	90.06	40,937	99%
92	6.8	206,408	5.9	0.21	11.01	0.00	8.81	8.81	90.05	40,932	99%
94	6.2	206,163	5.9	0.21	10.86	0.00	8.81	8.81	90.03	40,924	99%
96	5.7	205,849	5.9	0.21	10.67	0.00	8.80	8.80	90.01	40,915	99%
98	5.2	205,472	5.9	0.21	10.44	0.00	8.79	8.79	89.99	40,903	99%
100	4.7	205,038	5.9	0.21	10.18	0.00	8.79	8.79	89.96	40,890	99%
102	4.3	204,552	5.9	0.21	9.89	0.00	8.78	8.78	89.93	40,875	99%
104	4.0	204,019	5.9	0.21	9.58	0.00	8.76	8.76	89.89	40,859	99%
106	3.6	203,442	5.9	0.21	9.25	0.00	8.75	8.75	89.85	40,842	99%
108	3.3	202,826	5.9	0.21	8.89	0.00	8.74	8.74	89.81	40,823	99%
110	3.0	202,175	5.8	0.21	8.52	0.00	8.73	8.52	89.77	40,803	99%
112	2.8	201,515	5.8	0.21	8.16	0.00	8.71	8.16	89.72	40,782	99%
114	2.5	200,869	5.8	0.21	7.80	0.00	8.70	7.80	89.68	40,763	99%
116	2.3	200,237	5.8	0.21	7.46	0.00	8.69	7.46	89.63	40,743	99%
118	2.1	199,620	5.8	0.21	7.13	0.00	8.68	7.13	89.59	40,724	99%
120	1.9	199,019	5.8	0.21	6.81	0.00	8.66	6.81	89.55	40,705	99%
122	1.8	198,434	5.8	0.21	6.51	0.00	8.65	6.51	89.51	40,687	99%
124	1.6	197,865	5.7	0.21	6.22	0.00	8.64	6.22	89.47	40,669	99%
126	1.5	197,313	5.7	0.21	5.94	0.00	8.63	5.94	89.43	40,652	100%
128	1.4	196,778	5.7	0.21	5.68	0.00	8.62	5.68	89.40	40,635	100%
130	1.2	196,259	5.7	0.21	5.43	0.00	8.61	5.43	89.36	40,619	100%
132	1.1	195,757	5.7	0.21	5.18	0.00	8.60	5.18	89.33	40,603	100%
134	1.0	195,271	5.7	0.21	4.95	0.00	8.59	4.95	89.29	40,588	100%
136	0.9	194,800	5.7	0.21	4.74	0.00	8.58	4.74	89.26	40,573	100%
138	0.9	194,346	5.7	0.21	4.53	0.00	8.57	4.53	89.23	40,558	100%
140	0.8	193,906	5.6	0.21	4.33	0.00	8.56	4.33	89.20	40,544	100%
142	0.7	193,482	5.6	0.21	4.14	0.00	8.55	4.14	89.17	40,531	100%
144	0.7	193,072	5.6	0.21	3.96	0.00	8.54	3.96	89.14	40,518	100%
146	0.6	192,676	5.6	0.21	3.79	0.00	8.54	3.79	89.11	40,505	100%
148	0.6	192,294	5.6	0.21	3.63	0.00	8.53	3.63	89.08	40,493	100%
150	0.5	191,925	5.6	0.21	3.47	0.00	8.52	3.47	89.06	40,481	100%
152	0.5	191,569	5.6	0.21	3.33	0.00	8.51	3.33	89.03	40,470	100%
154	0.4	191,225	5.6	0.21	3.19	0.00	8.51	3.19	89.01	40,459	100%
156	0.4	190,893	5.6	0.21	3.06	0.00	8.50	3.06	88.99	40,448	100%
158	0.4	190,573	5.6	0.21	2.93	0.00	8.49	2.93	88.96	40,438	100%
160	0.3	190,264	5.6	0.21	2.81	0.00	8.49	2.81	88.94	40,428	100%
162	0.3	189,966	5.5	0.21	2.70	0.00	8.48	2.70	88.92	40,418	100%
164	0.3	189,678	5.5	0.21	2.59	0.00	8.47	2.59	88.90	40,409	100%
166	0.2	189,400	5.5	0.21	2.48	0.00	8.47	2.48	88.88	40,400	100%
168	0.2	189,131	5.5	0.21	2.39	0.00	8.46	2.39	88.86	40,391	100%
170	0.2	188,872	5.5	0.21	2.29	0.00	8.46	2.29	88.84	40,383	100%
172	0.2	188,622	5.5	0.21	2.20	0.00	8.45	2.20	88.82	40,374	100%
174	0.2	188,380	5.5	0.21	2.12	0.00	8.45	2.12	88.81	40,367	100%
176	0.2	188,146	5.5	0.21	2.04	0.00	8.44	2.04	88.79	40,359	100%
178	0.1	187,921	5.5	0.21	1.96	0.00	8.44	1.96	88.77	40,352	100%
180	0.1	187,703	5.5	0.21	1.89	0.00	8.43	1.89	88.76	40,344	100%
182	0.1	187,492	5.5	0.21	1.82	0.00	8.43	1.82	88.74	40,338	100%
184	0.1	187,288	5.5	0.21	1.75	0.00	8.42	1.75	88.73	40,331	100%
186	0.1	187,091	5.5	0.21	1.69	0.00	8.42	1.69	88.71	40,324	100%
188	0.1	186,901	5.5	0.21	1.63	0.00	8.41	1.63	88.70	40,318	100%
190	0.1	186,716	5.5	0.21	1.57	0.00	8.41	1.57	88.69	40,312	100%
192	0.1	186,538	5.5	0.21	1.52	0.00	8.41	1.52	88.67	40,306	100%
194	0.1	186,365	5.5	0.21	1.46	0.00	8.40	1.46	88.66	40,301	100%
196	0.1	186,198	5.4	0.21	1.41	0.00	8.40	1.41	88.65	40,295	100%
198	0.1	186,037	5.4	0.21	1.37	0.00	8.40	1.37	88.64	40,290	100%
200	0.1	185,880	5.4	0.21	1.32	0.00	8.39	1.32	88.63	40,285	100%
202	0.0	185,728	5.4	0.21	1.28	0.00	8.39	1.28	88.62	40,280	100%
204	0.0	185,581	5.4	0.21	1.23	0.00	8.39	1.23	88.60	40,275	100%
206	0.0	185,438	5.4	0.21	1.19	0.00	8.38	1.19	88.59	40,270	100%


Sediment Basin #4 Colon Mine Phase 1 Hydrograph
25-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #5	Sheet: 1	Of: 4

Objective Design the sediment basin to contain the 10-year storm and pass the 100-year storm without over topping the berm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. VA Erosion and Sediment Control Handbook
3. NOAA Atlas 14, Volume 2, Version 3

Given

Phase	1	2	2	2		
Storm Event (yrs) =	10	10	25	100		
Total Drainage Area A (ac) =	49.3	42.1	42.1	42.1		
Disturbed Area (ac) =	49.3	42.1	42.1	42.1		
Curve Number CN =	89	88	88	88	Hydrographs	
Rainfall Depth P (in) =	5.28	5.28	6.28	7.88	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	301.78	252.52	310.28	402.08	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	88,740	cf (based on largest Phase)
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	131,274	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
255	0	118,763	0	0	0
256	1	124,341	121,541	121,541	4,502
257	2	129,979	127,150	248,691	9,211
258	3	135,678	132,818	381,509	14,130
259	4	141,437	138,548	520,057	19,261
260	5	147,256	144,337	664,393	24,607
261	6	153,136	150,186	814,580	30,170

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 381,509 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 135,678 *Required Surface Area Achieved*

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #5	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	381,509		
Number of Skimmers	2		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	38,151		0.44 cfs
Selected Skimmer Size (inches) =	6		
Head on Skimmer (feet) =	0.417		
Diameter of Orifice (inches) =	5.1		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	2	2	2
Storm Event (yrs) =	10	10	25	100
S =	1.24	1.36	1.36	1.36
Runoff Depth Q* (inches) =	4.04	3.94	4.90	6.45
Time to Peak T_p (min) =	28.73	28.56	28.91	29.40

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	381,509
Z_2 (ft) =	6	S_2 (cf) =	814,580

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.1 Ref 2, III-8

$K_S = S_2/Z_2^{\,b}$ = 114,650

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #5	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor =	3.281	ft/sec per m/sec	
Gravitational Acceleration, g (m/s^2) =	9.81		
Specific Gravity of soil (s_s)=	2.6		
Kinematic Viscosity of water (v) =	1.14E-06	n^2 / sec @ 20° C	Ref 2, IV-11
Diameter of the Design Particle d_{15} =	40.00E-06	m	

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / v] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 6.00
Set Top of Dam at (ft) = 7.00 *See Hydrograph*

Emergency Spillway

Q_E (cfs) = 100-Yr Storm
Q_E (cfs) = 2.9

Cross Section =	Trapezoid		
Channel Side Slope (z) =	5	(enter X for X:1)	
n =	0.03	Grass Lined	
Vp (ft/sec) =	5.0	Permissible Velocity for lining	Ref 2, II-7
Allowable Shear Stress (psf) =	2.0	Allowable Shear Stress for lining	
Bottom Width, b (ft) =	20		

Calculate Required Depth of Spillway:
Normal-Depth Procedure

$AR^{2/3}=Qn/1.49s^{0.5}$ Q=VA
$Z_{req}=Qn/1.49s^{0.5}$ Area (A)= bd+z(d^2)
$Z_{av}=AR^{2/3}$ R=Area/(b+2d((z^2)+1)^.5)
Avg Shear Stress(T) = K_b*d*s*unit weight of water

Channel Slope ft/ft	Depth, d (ft)	A (sf)	Z_{req}	R	Z_{avail}	V (ft/sec)	T (psf)
0.01	0.18	3.77	0.58	0.17	1.17	1.5	0.1
0.02	0.15	3.03	0.41	0.14	0.82	1.9	0.2

Construct the channel to be :	20	ft, Bottom Width (measured at top of lining)
	1.0	ft, depth (measured at top of lining)
	1%	slope

Anti-Seep Collar:

Anti-Seep Collar Size =	2 * Barrel Dia	
Anti-Seep Collar Size (ft) =	4	
Use Anti-Seep Collar Size (ft) =	4	x 4

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #5	Sheet: 4	Of: 4

Minimum Concrete Base for Riser:

Diameter of Riser (in) =	48	From Hydrograph
Avg Density of Concrete (lbs/cf) =	87.6	
Density of Water (lbs/cf) =	62.4	
Riser Displacement (cf) =	66.60	Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy =	27^{-1}	
Min Concrete Needed (cy) =	1.76	
Width & Length (ft) =	5	
Thickness (ft) =	1.9	

Anti-Vortex Device:

Diameter of Riser (in) =	48	From Hydrograph
Cylinder Diameter (in) =	78	Ref 3, III-104, Table 3.14-D
Cylinder Thickness (gage) =	16	
Cylinder Height (in) =	25	

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	12	6 * Barrel Diameter
Q_B (cfs) =	5.1	Peak Flow out of the barrel 25-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
5.1	1.66	0.51	7.4	0.43	4.22	0.7

Flow Depth = Tailwater, d (ft) = 0.51 0.5* Barrel Diameter (ft) = 1.00 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
2	6	10	12	0.3	Class A

Conclusion

The basin can contain the 10-yr storm and pass the 100-yr storm without overtopping the berm.

HDR Computation

Job No. 06985-10570-018

Project:	Charah Colon Mine	Computed: PAW	Date: 12/31/14
Subject:	Permit Application	Checked: EAW	Date: 1/2/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	48	
Circumference of Riser (in) =	150.8	
eight of Riser from bottom of barrel (in) =	64	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	2	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.00	0.00
0.39	0.00	0.00	0.00			0.00	0.00
0.44	0.00	0.00	0.00			0.88	0.88
0.49	0.00	0.00	0.00			0.88	0.88
0.54	0.00	0.00	0.00			0.88	0.88
0.59	0.00	0.00	0.00			0.88	0.88
0.64	0.00	0.00	0.00			0.88	0.88
0.69	0.00	0.00	0.00			0.88	0.88
0.74	0.00	0.00	0.00			0.88	0.88
0.79	0.00	0.00	0.00			0.88	0.88
0.84	0.00	0.00	0.00			0.88	0.88
0.89	0.00	0.00	0.00			0.88	0.88
0.94	0.00	0.00	0.00			0.88	0.88
0.99	0.00	0.00	0.00			0.88	0.88
1.04	0.00	0.00	0.00			0.88	0.88
1.09	0.00	0.00	0.00			0.88	0.88
1.14	0.00	0.00	0.00			0.88	0.88
1.19	0.00	0.00	0.00			0.88	0.88
1.24	0.00	0.00	0.00			0.88	0.88
1.29	0.00	0.00	0.00			0.88	0.88
1.34	0.00	0.00	0.00			0.88	0.88
1.39	0.00	0.00	0.00			0.88	0.88
1.44	0.00	0.00	0.00			0.88	0.88
1.49	0.00	0.00	0.00			0.88	0.88
1.54	0.00	0.00	0.00			0.88	0.88
1.59	0.00	0.00	0.00			0.88	0.88

1.64	0.00	0.00	0.00	0.88	0.88
1.69	0.00	0.00	0.00	0.88	0.88
1.74	0.00	0.00	0.00	0.88	0.88
1.79	0.00	0.00	0.00	0.88	0.88
1.84	0.00	0.00	0.00	0.88	0.88
1.89	0.00	0.00	0.00	0.88	0.88
1.94	0.00	0.00	0.00	0.88	0.88
1.99	0.00	0.00	0.00	0.88	0.88
2.04	0.00	0.00	0.00	0.88	0.88
2.09	0.00	0.00	0.00	0.88	0.88
2.14	0.00	0.00	0.00	0.88	0.88
2.19	0.00	0.00	0.00	0.88	0.88
2.24	0.00	0.00	0.00	0.88	0.88
2.29	0.00	0.00	0.00	0.88	0.88
2.34	0.00	0.00	0.00	0.88	0.88
2.39	0.00	0.00	0.00	0.88	0.88
2.44	0.00	0.00	0.00	0.88	0.88
2.49	0.00	0.00	0.00	0.88	0.88
2.54	0.00	0.00	0.00	0.88	0.88
2.59	0.00	0.00	0.00	0.88	0.88
2.64	0.00	0.00	0.00	0.88	0.88
2.69	0.00	0.00	0.00	0.88	0.88
2.74	0.00	0.00	0.00	0.88	0.88
2.79	0.00	0.00	0.00	0.88	0.88
2.84	0.00	0.00	0.00	0.88	0.88
2.89	0.00	0.00	0.00	0.88	0.88
2.94	0.00	0.00	0.00	0.88	0.88
2.99	0.00	0.00	0.00	0.88	0.88
3.04	0.00	0.00	0.00	0.88	0.88
3.09	0.00	0.00	0.00	0.88	0.88
3.14	0.00	0.00	0.00	0.88	0.88
3.19	0.00	0.00	0.00	0.88	0.88
3.24	0.00	0.00	0.00	0.88	0.88
3.29	0.00	0.00	0.00	0.88	0.88
3.34	0.00	0.00	0.00	0.88	0.88
3.39	0.00	0.00	0.00	0.88	0.88
3.44	0.00	0.00	0.00	0.88	0.88
3.49	0.00	0.00	0.00	0.88	0.88
3.54	0.00	0.00	0.00	0.88	0.88
3.59	0.00	0.00	0.00	0.88	0.88
3.64	0.00	0.00	0.00	0.88	0.88
3.69	0.00	0.00	0.00	0.88	0.88
3.74	0.00	0.00	0.00	0.88	0.88
3.79	0.00	0.00	0.00	0.88	0.88
3.84	0.00	0.00	0.00	0.88	0.88
3.89	0.00	0.00	0.00	0.88	0.88
3.94	0.00	0.00	0.00	0.88	0.88
3.99	0.00	0.00	0.00	0.88	0.88

Qp = 301.78 cfs

Tp = 28.73 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 5 Colon

Phase 1

10 - year Storm Event

b = 1.1

K_s = 114,650

Number of Riser/Barrel Assemblies	2			
Diameter of Barrel =	24	(in)		
Height of Riser above barrel =	3.3	(ft)		
Height of Riser from bottom of barrel=	5.3	(ft) elevation	260.30	
Emergency Spillway =	6.0	(ft) elevation	261.00	
Total Height of Dam =	7.0	(ft) elevation	262.00	
Length of Emergency Spillway =	20	(ft)		
Diameter of Riser =	48	(in)		
Permanent Pond Stage =	0	(ft) elevation	255.0	

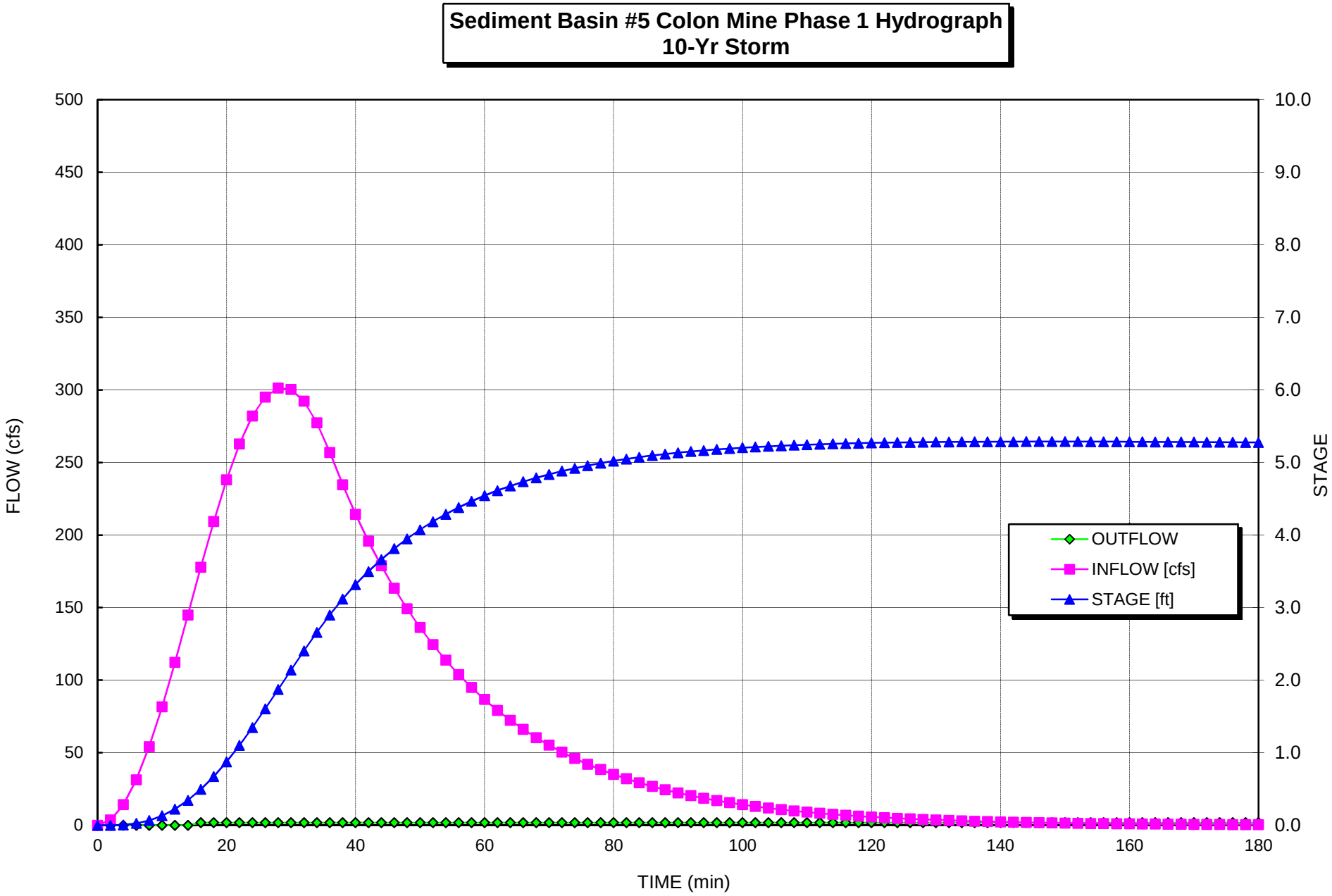
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.3	ft Maximum Stage	260.29	msl elevation
1.8	cfs Peak outflow		
1.8	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	3.6	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	14.2	431	0.0	0.00	0.00	0.00	0.00	0.00	170.58	77,537	N/A
6	31.3	2,136	0.0	0.00	0.00	0.00	0.00	0.00	195.81	89,003	N/A
8	54.1	5,895	0.1	0.00	0.00	0.00	0.00	0.00	213.72	97,144	N/A
10	81.6	12,393	0.1	0.00	0.00	0.00	0.00	0.00	227.85	103,570	N/A
12	112.3	22,181	0.2	0.00	0.00	0.00	0.00	0.00	239.58	108,900	N/A
14	144.9	35,658	0.3	0.00	0.00	0.00	0.00	0.00	249.59	113,449	N/A
16	177.7	53,042	0.5	0.88	0.88	0.00	0.88	1.77	258.28	117,400	100%
18	209.3	74,157	0.7	0.88	0.88	0.00	0.88	1.77	265.85	120,840	100%
20	238.1	99,061	0.9	0.88	0.88	0.00	0.88	1.77	272.57	123,895	100%
22	262.7	127,420	1.1	0.88	0.88	0.00	0.88	1.77	278.55	126,613	100%
24	282.0	158,736	1.3	0.88	0.88	0.00	0.88	1.77	283.88	129,034	100%
26	295.1	192,369	1.6	0.88	0.88	0.00	0.88	1.77	288.62	131,190	100%
28	301.3	227,570	1.9	0.88	0.88	0.00	0.88	1.77	292.83	133,104	100%
30	300.3	263,514	2.1	0.88	0.88	0.00	0.88	1.77	296.55	134,798	100%
32	292.2	299,341	2.4	0.88	0.88	0.00	0.88	1.77	299.83	136,287	100%
34	277.4	334,197	2.7	0.88	0.88	0.00	0.88	1.77	302.69	137,587	100%
36	256.9	367,275	2.9	0.88	0.88	0.00	0.88	1.77	305.16	138,711	100%
38	234.7	397,889	3.1	0.88	0.88	0.00	0.88	1.77	307.28	139,672	100%
40	214.4	425,835	3.3	0.88	0.88	0.00	0.88	1.77	309.08	140,492	100%
42	195.8	451,346	3.5	0.88	0.88	0.00	0.88	1.77	310.64	141,198	100%
44	178.9	474,630	3.7	0.88	0.88	0.00	0.88	1.77	311.99	141,812	100%
46	163.4	495,882	3.8	0.88	0.88	0.00	0.88	1.77	313.17	142,348	100%
48	149.3	515,277	3.9	0.88	0.88	0.00	0.88	1.77	314.20	142,820	100%
50	136.3	532,975	4.1	0.88	0.88	0.00	0.88	1.77	315.12	143,236	100%
52	124.5	549,123	4.2	0.88	0.88	0.00	0.88	1.77	315.93	143,605	100%
54	113.8	563,856	4.3	0.88	0.88	0.00	0.88	1.77	316.65	143,933	100%
56	103.9	577,296	4.4	0.88	0.88	0.00	0.88	1.77	317.30	144,226	100%
58	94.9	589,555	4.5	0.88	0.88	0.00	0.88	1.77	317.87	144,487	100%
60	86.7	600,734	4.5	0.88	0.88	0.00	0.88	1.77	318.39	144,722	100%
62	79.2	610,928	4.6	0.88	0.88	0.00	0.88	1.77	318.85	144,932	100%
64	72.4	620,222	4.7	0.88	0.88	0.00	0.88	1.77	319.26	145,120	100%
66	66.1	628,693	4.7	0.88	0.88	0.00	0.88	1.77	319.64	145,290	100%
68	60.4	636,413	4.8	0.88	0.88	0.00	0.88	1.77	319.97	145,443	100%
70	55.2	643,447	4.8	0.88	0.88	0.00	0.88	1.77	320.28	145,581	100%
72	50.4	649,854	4.9	0.88	0.88	0.00	0.88	1.77	320.55	145,705	100%
74	46.0	655,688	4.9	0.88	0.88	0.00	0.88	1.77	320.80	145,818	100%
76	42.0	660,998	5.0	0.88	0.88	0.00	0.88	1.77	321.02	145,919	100%
78	38.4	665,832	5.0	0.88	0.88	0.00	0.88	1.77	321.22	146,011	100%
80	35.1	670,228	5.0	0.88	0.88	0.00	0.88	1.77	321.41	146,094	100%
82	32.0	674,226	5.0	0.88	0.88	0.00	0.88	1.77	321.57	146,169	100%

84	29.3	677,859	5.1	0.88	0.88	0.00	0.88	1.77	321.72	146,236	100%
86	26.7	681,160	5.1	0.88	0.88	0.00	0.88	1.77	321.85	146,298	100%
88	24.4	684,157	5.1	0.88	0.88	0.00	0.88	1.77	321.98	146,353	100%
90	22.3	686,876	5.1	0.88	0.88	0.00	0.88	1.77	322.09	146,403	100%
92	20.4	689,342	5.2	0.88	0.88	0.00	0.88	1.77	322.19	146,448	100%
94	18.6	691,576	5.2	0.88	0.88	0.00	0.88	1.77	322.28	146,489	100%
96	17.0	693,598	5.2	0.88	0.88	0.00	0.88	1.77	322.36	146,526	100%
98	15.5	695,427	5.2	0.88	0.88	0.00	0.88	1.77	322.43	146,559	100%
100	14.2	697,080	5.2	0.88	0.88	0.00	0.88	1.77	322.50	146,589	100%
102	13.0	698,571	5.2	0.88	0.88	0.00	0.88	1.77	322.56	146,616	100%
104	11.8	699,915	5.2	0.88	0.88	0.00	0.88	1.77	322.61	146,641	100%
106	10.8	701,124	5.2	0.88	0.88	0.00	0.88	1.77	322.66	146,662	100%
108	9.9	702,210	5.2	0.88	0.88	0.00	0.88	1.77	322.70	146,682	100%
110	9.0	703,184	5.2	0.88	0.88	0.00	0.88	1.77	322.74	146,699	100%
112	8.2	704,055	5.3	0.88	0.88	0.00	0.88	1.77	322.77	146,715	100%
114	7.5	704,833	5.3	0.88	0.88	0.00	0.88	1.77	322.80	146,729	100%
116	6.9	705,525	5.3	0.88	0.88	0.00	0.88	1.77	322.83	146,741	100%
118	6.3	706,138	5.3	0.88	0.88	0.00	0.88	1.77	322.86	146,752	100%
120	5.7	706,681	5.3	0.88	0.88	0.00	0.88	1.77	322.88	146,762	100%
122	5.2	707,158	5.3	0.88	0.88	0.00	0.88	1.77	322.90	146,771	100%
124	4.8	707,575	5.3	0.88	0.88	0.00	0.88	1.77	322.91	146,778	100%
126	4.4	707,938	5.3	0.88	0.88	0.00	0.88	1.77	322.93	146,785	100%
128	4.0	708,251	5.3	0.88	0.88	0.00	0.88	1.77	322.94	146,790	100%
130	3.7	708,519	5.3	0.88	0.88	0.00	0.88	1.77	322.95	146,795	100%
132	3.3	708,745	5.3	0.88	0.88	0.00	0.88	1.77	322.96	146,799	100%
134	3.0	708,934	5.3	0.88	0.88	0.00	0.88	1.77	322.97	146,802	100%
136	2.8	709,087	5.3	0.88	0.88	0.00	0.88	1.77	322.97	146,805	100%
138	2.5	709,209	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,807	100%
140	2.3	709,303	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,809	100%
142	2.1	709,369	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,810	100%
144	1.9	709,412	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,811	100%
146	1.8	709,433	5.3	0.88	0.88	0.00	0.88	1.77	322.99	146,811	100%
148	1.6	709,433	5.3	0.88	0.88	0.00	0.88	1.77	322.99	146,811	100%
150	1.5	709,415	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,811	100%
152	1.3	709,381	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,810	100%
154	1.2	709,331	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,810	100%
156	1.1	709,267	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,808	100%
158	1.0	709,190	5.3	0.88	0.88	0.00	0.88	1.77	322.98	146,807	100%
160	0.9	709,101	5.3	0.88	0.88	0.00	0.88	1.77	322.97	146,805	100%
162	0.9	709,002	5.3	0.88	0.88	0.00	0.88	1.77	322.97	146,804	100%
164	0.8	708,893	5.3	0.88	0.88	0.00	0.88	1.77	322.96	146,802	100%
166	0.7	708,775	5.3	0.88	0.88	0.00	0.88	1.77	322.96	146,800	100%
168	0.7	708,649	5.3	0.88	0.88	0.00	0.88	1.77	322.95	146,797	100%
170	0.6	708,516	5.3	0.88	0.88	0.00	0.88	1.77	322.95	146,795	100%
172	0.5	708,376	5.3	0.88	0.88	0.00	0.88	1.77	322.94	146,793	100%
174	0.5	708,229	5.3	0.88	0.88	0.00	0.88	1.77	322.94	146,790	100%
176	0.5	708,077	5.3	0.88	0.88	0.00	0.88	1.77	322.93	146,787	100%
178	0.4	707,920	5.3	0.88	0.88	0.00	0.88	1.77	322.93	146,784	100%
180	0.4	707,758	5.3	0.88	0.88	0.00	0.88	1.77	322.92	146,781	100%
182	0.3	707,591	5.3	0.88	0.88	0.00	0.88	1.77	322.91	146,778	100%
184	0.3	707,421	5.3	0.88	0.88	0.00	0.88	1.77	322.91	146,775	100%
186	0.3	707,247	5.3	0.88	0.88	0.00	0.88	1.77	322.90	146,772	100%
188	0.3	707,070	5.3	0.88	0.88	0.00	0.88	1.77	322.89	146,769	100%
190	0.2	706,890	5.3	0.88	0.88	0.00	0.88	1.77	322.89	146,766	100%
192	0.2	706,707	5.3	0.88	0.88	0.00	0.88	1.77	322.88	146,763	100%
194	0.2	706,522	5.3	0.88	0.88	0.00	0.88	1.77	322.87	146,759	100%
196	0.2	706,334	5.3	0.88	0.88	0.00	0.88	1.77	322.86	146,756	100%
198	0.2	706,144	5.3	0.88	0.88	0.00	0.88	1.77	322.86	146,753	100%
200	0.2	705,952	5.3	0.88	0.88	0.00	0.88	1.77	322.85	146,749	100%
202	0.1	705,759	5.3	0.88	0.88	0.00	0.88	1.77	322.84	146,746	100%
204	0.1	705,564	5.3	0.88	0.88	0.00	0.88	1.77	322.83	146,742	100%
206	0.1	705,367	5.3	0.88	0.88	0.00	0.88	1.77	322.83	146,739	100%


Sediment Basin #5 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

Qp = 252.52 cfs

Tp = 28.56 minutes

dT = Max of **2** minutes

or **1.0%** of increment to peak

Sediment Basin # 5 Colon

Phase 2

10 - year Storm Event

b = 1.1

Ks = 114,650

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	3.3	(ft)	
Height of Riser from bottom of barrel=	5.3	(ft) elevation	260.30
Emergency Spillway =	6	(ft) elevation	261.00
Total Height of Dam =	7	(ft) elevation	262.00
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	48	(in)	
Permanent Pond Stage =	0	(ft) elevation	255.0

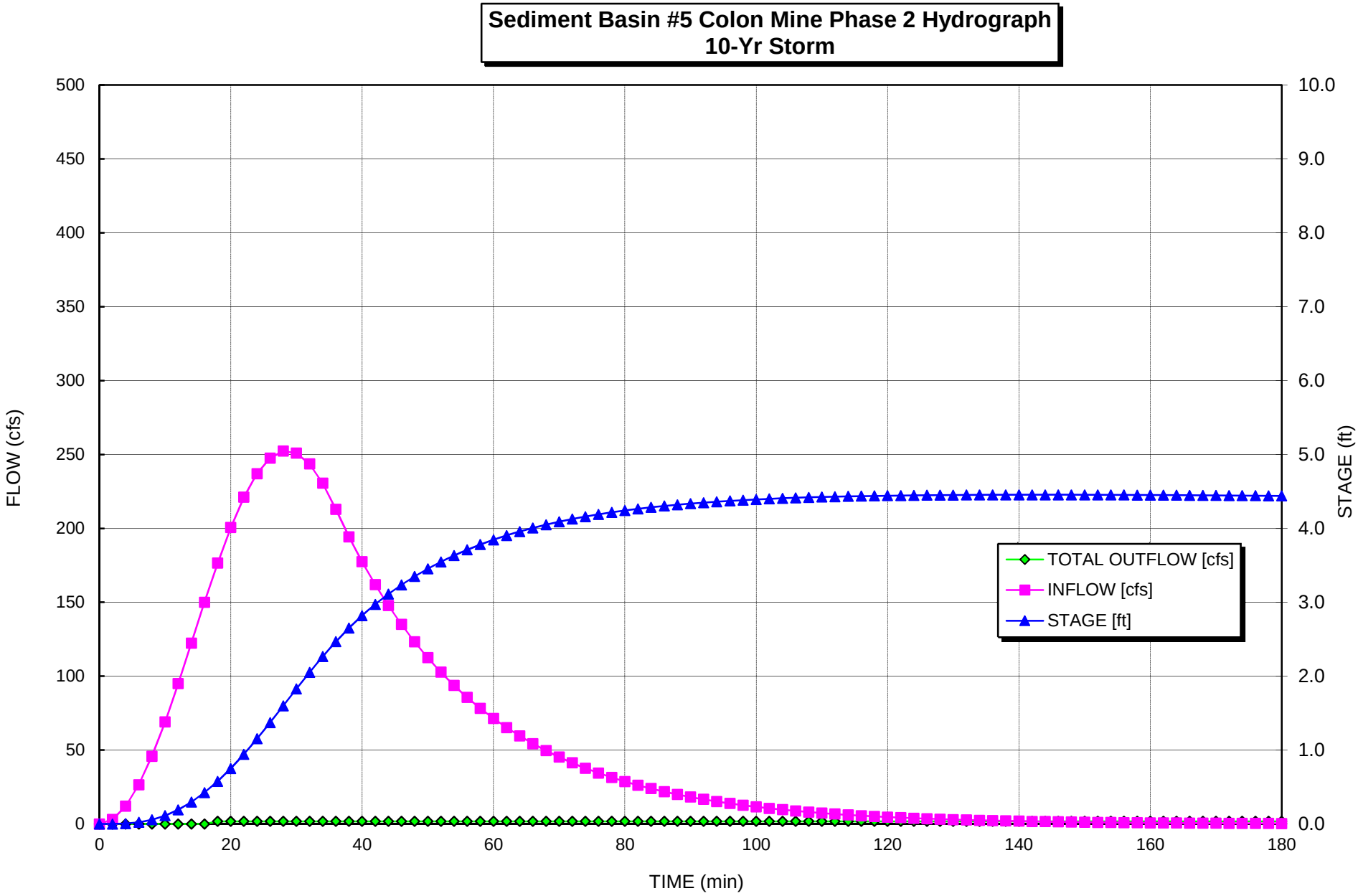
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
4.5	ft Maximum Stage	259.46	msl elevation
1.8	cfs Peak outflow		
1.8	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	3.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	12.0	365	0.0	0.00	0.00	0.00	0.00	0.00	168.15	76,434	N/A
6	26.5	1,809	0.0	0.00	0.00	0.00	0.00	0.00	193.02	87,736	N/A
8	45.8	4,991	0.1	0.00	0.00	0.00	0.00	0.00	210.67	95,759	N/A
10	69.0	10,489	0.1	0.00	0.00	0.00	0.00	0.00	224.60	102,091	N/A
12	94.9	18,769	0.2	0.00	0.00	0.00	0.00	0.00	236.15	107,343	N/A
14	122.4	30,161	0.3	0.00	0.00	0.00	0.00	0.00	246.01	111,823	N/A
16	150.0	44,847	0.4	0.00	0.00	0.00	0.00	0.00	254.57	115,713	N/A
18	176.5	62,850	0.6	0.88	0.88	0.00	0.88	1.77	262.08	119,129	100%
20	200.6	83,819	0.8	0.88	0.88	0.00	0.88	1.77	268.67	122,123	100%
22	221.1	107,677	0.9	0.88	0.88	0.00	0.88	1.77	274.54	124,789	100%
24	237.0	133,993	1.2	0.88	0.88	0.00	0.88	1.77	279.76	127,163	100%
26	247.6	162,218	1.4	0.88	0.88	0.00	0.88	1.77	284.41	129,276	100%
28	252.3	191,713	1.6	0.88	0.88	0.00	0.88	1.77	288.53	131,151	100%
30	250.9	221,774	1.8	0.88	0.88	0.00	0.88	1.77	292.18	132,808	100%
32	243.6	251,675	2.1	0.88	0.88	0.00	0.88	1.77	295.38	134,264	100%
34	230.6	280,692	2.3	0.88	0.88	0.00	0.88	1.77	298.17	135,533	100%
36	212.9	308,147	2.5	0.88	0.88	0.00	0.88	1.77	300.58	136,628	100%
38	194.3	333,478	2.7	0.88	0.88	0.00	0.88	1.77	302.64	137,562	100%
40	177.4	356,585	2.8	0.88	0.88	0.00	0.88	1.77	304.39	138,359	100%
42	162.0	377,663	3.0	0.88	0.88	0.00	0.88	1.77	305.90	139,045	100%
44	147.9	396,889	3.1	0.88	0.88	0.00	0.88	1.77	307.21	139,642	100%
46	135.0	414,423	3.2	0.88	0.88	0.00	0.88	1.77	308.36	140,163	100%
48	123.3	430,413	3.3	0.88	0.88	0.00	0.88	1.77	309.37	140,621	100%
50	112.5	444,993	3.5	0.88	0.88	0.00	0.88	1.77	310.26	141,026	100%
52	102.7	458,285	3.5	0.88	0.88	0.00	0.88	1.77	311.04	141,384	100%
54	93.8	470,403	3.6	0.88	0.88	0.00	0.88	1.77	311.75	141,702	100%
56	85.6	481,447	3.7	0.88	0.88	0.00	0.88	1.77	312.37	141,986	100%
58	78.2	491,512	3.8	0.88	0.88	0.00	0.88	1.77	312.93	142,240	100%
60	71.4	500,683	3.8	0.88	0.88	0.00	0.88	1.77	313.43	142,466	100%
62	65.2	509,037	3.9	0.88	0.88	0.00	0.88	1.77	313.87	142,670	100%
64	59.5	516,646	4.0	0.88	0.88	0.00	0.88	1.77	314.28	142,852	100%
66	54.3	523,574	4.0	0.88	0.88	0.00	0.88	1.77	314.64	143,017	100%
68	49.6	529,881	4.1	0.88	0.88	0.00	0.88	1.77	314.96	143,164	100%
70	45.3	535,621	4.1	0.88	0.88	0.00	0.88	1.77	315.25	143,297	100%
72	41.3	540,842	4.1	0.88	0.88	0.00	0.88	1.77	315.52	143,417	100%
74	37.7	545,591	4.2	0.88	0.88	0.00	0.88	1.77	315.76	143,525	100%
76	34.5	549,908	4.2	0.88	0.88	0.00	0.88	1.77	315.97	143,623	100%
78	31.5	553,831	4.2	0.88	0.88	0.00	0.88	1.77	316.16	143,711	100%
80	28.7	557,395	4.2	0.88	0.88	0.00	0.88	1.77	316.34	143,790	100%
82	26.2	560,629	4.3	0.88	0.88	0.00	0.88	1.77	316.50	143,862	100%
84	23.9	563,564	4.3	0.88	0.88	0.00	0.88	1.77	316.64	143,927	100%

86	21.9	566,225	4.3	0.88	0.88	0.00	0.88	1.77	316.77	143,985	100%
88	20.0	568,636	4.3	0.88	0.88	0.00	0.88	1.77	316.88	144,038	100%
90	18.2	570,818	4.3	0.88	0.88	0.00	0.88	1.77	316.99	144,086	100%
92	16.6	572,793	4.3	0.88	0.88	0.00	0.88	1.77	317.08	144,129	100%
94	15.2	574,577	4.4	0.88	0.88	0.00	0.88	1.77	317.17	144,167	100%
96	13.9	576,187	4.4	0.88	0.88	0.00	0.88	1.77	317.24	144,202	100%
98	12.7	577,639	4.4	0.88	0.88	0.00	0.88	1.77	317.31	144,233	100%
100	11.6	578,946	4.4	0.88	0.88	0.00	0.88	1.77	317.38	144,261	100%
102	10.6	580,121	4.4	0.88	0.88	0.00	0.88	1.77	317.43	144,287	100%
104	9.6	581,175	4.4	0.88	0.88	0.00	0.88	1.77	317.48	144,309	100%
106	8.8	582,119	4.4	0.88	0.88	0.00	0.88	1.77	317.52	144,329	100%
108	8.0	582,962	4.4	0.88	0.88	0.00	0.88	1.77	317.56	144,347	100%
110	7.3	583,714	4.4	0.88	0.88	0.00	0.88	1.77	317.60	144,363	100%
112	6.7	584,381	4.4	0.88	0.88	0.00	0.88	1.77	317.63	144,378	100%
114	6.1	584,972	4.4	0.88	0.88	0.00	0.88	1.77	317.66	144,390	100%
116	5.6	585,494	4.4	0.88	0.88	0.00	0.88	1.77	317.68	144,401	100%
118	5.1	585,951	4.4	0.88	0.88	0.00	0.88	1.77	317.70	144,411	100%
120	4.6	586,350	4.4	0.88	0.88	0.00	0.88	1.77	317.72	144,420	100%
122	4.2	586,696	4.4	0.88	0.88	0.00	0.88	1.77	317.74	144,427	100%
124	3.9	586,994	4.4	0.88	0.88	0.00	0.88	1.77	317.75	144,433	100%
126	3.5	587,247	4.4	0.88	0.88	0.00	0.88	1.77	317.76	144,439	100%
128	3.2	587,460	4.5	0.88	0.88	0.00	0.88	1.77	317.77	144,443	100%
130	2.9	587,635	4.5	0.88	0.88	0.00	0.88	1.77	317.78	144,447	100%
132	2.7	587,777	4.5	0.88	0.88	0.00	0.88	1.77	317.79	144,450	100%
134	2.5	587,888	4.5	0.88	0.88	0.00	0.88	1.77	317.79	144,452	100%
136	2.2	587,971	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,454	100%
138	2.0	588,029	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,455	100%
140	1.9	588,063	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,456	100%
142	1.7	588,075	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,456	100%
144	1.6	588,068	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,456	100%
146	1.4	588,044	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,455	100%
148	1.3	588,002	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,455	100%
150	1.2	587,946	4.5	0.88	0.88	0.00	0.88	1.77	317.80	144,453	100%
152	1.1	587,877	4.5	0.88	0.88	0.00	0.88	1.77	317.79	144,452	100%
154	1.0	587,795	4.5	0.88	0.88	0.00	0.88	1.77	317.79	144,450	100%
156	0.9	587,702	4.5	0.88	0.88	0.00	0.88	1.77	317.79	144,448	100%
158	0.8	587,598	4.5	0.88	0.88	0.00	0.88	1.77	317.78	144,446	100%
160	0.8	587,485	4.5	0.88	0.88	0.00	0.88	1.77	317.78	144,444	100%
162	0.7	587,363	4.5	0.88	0.88	0.00	0.88	1.77	317.77	144,441	100%
164	0.6	587,234	4.4	0.88	0.88	0.00	0.88	1.77	317.76	144,438	100%
166	0.6	587,097	4.4	0.88	0.88	0.00	0.88	1.77	317.76	144,435	100%
168	0.5	586,954	4.4	0.88	0.88	0.00	0.88	1.77	317.75	144,432	100%
170	0.5	586,805	4.4	0.88	0.88	0.00	0.88	1.77	317.74	144,429	100%
172	0.4	586,650	4.4	0.88	0.88	0.00	0.88	1.77	317.74	144,426	100%
174	0.4	586,491	4.4	0.88	0.88	0.00	0.88	1.77	317.73	144,422	100%
176	0.4	586,326	4.4	0.88	0.88	0.00	0.88	1.77	317.72	144,419	100%
178	0.3	586,158	4.4	0.88	0.88	0.00	0.88	1.77	317.71	144,415	100%
180	0.3	585,986	4.4	0.88	0.88	0.00	0.88	1.77	317.71	144,412	100%
182	0.3	585,810	4.4	0.88	0.88	0.00	0.88	1.77	317.70	144,408	100%
184	0.3	585,632	4.4	0.88	0.88	0.00	0.88	1.77	317.69	144,404	100%
186	0.2	585,450	4.4	0.88	0.88	0.00	0.88	1.77	317.68	144,400	100%
188	0.2	585,266	4.4	0.88	0.88	0.00	0.88	1.77	317.67	144,396	100%
190	0.2	585,079	4.4	0.88	0.88	0.00	0.88	1.77	317.66	144,392	100%
192	0.2	584,890	4.4	0.88	0.88	0.00	0.88	1.77	317.65	144,388	100%
194	0.2	584,699	4.4	0.88	0.88	0.00	0.88	1.77	317.65	144,384	100%
196	0.1	584,506	4.4	0.88	0.88	0.00	0.88	1.77	317.64	144,380	100%
198	0.1	584,312	4.4	0.88	0.88	0.00	0.88	1.77	317.63	144,376	100%
200	0.1	584,116	4.4	0.88	0.88	0.00	0.88	1.77	317.62	144,372	100%
202	0.1	583,919	4.4	0.88	0.88	0.00	0.88	1.77	317.61	144,368	100%
204	0.1	583,720	4.4	0.88	0.88	0.00	0.88	1.77	317.60	144,364	100%


Sediment Basin #5 Colon Mine Phase 2 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE (ft)
TIME (min)
TOTAL OUTFLOW [cfs]
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Sediment Basin # 5 Colon

Phase 2

25 - year Storm Event

Qp =	310.28	cfs
Tp =	28.91	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.1

Ks = 114,650

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	3.3	(ft)	
Height of Riser from bottom of barrel=	5.3	(ft) elevation	260.30
Emergency Spillway =	6.0	(ft) elevation	261.00
Total Height of Dam =	7.0	(ft) elevation	262.00
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	48	(in)	
Permanent Pond Stage =	0	(ft) elevation	255.0

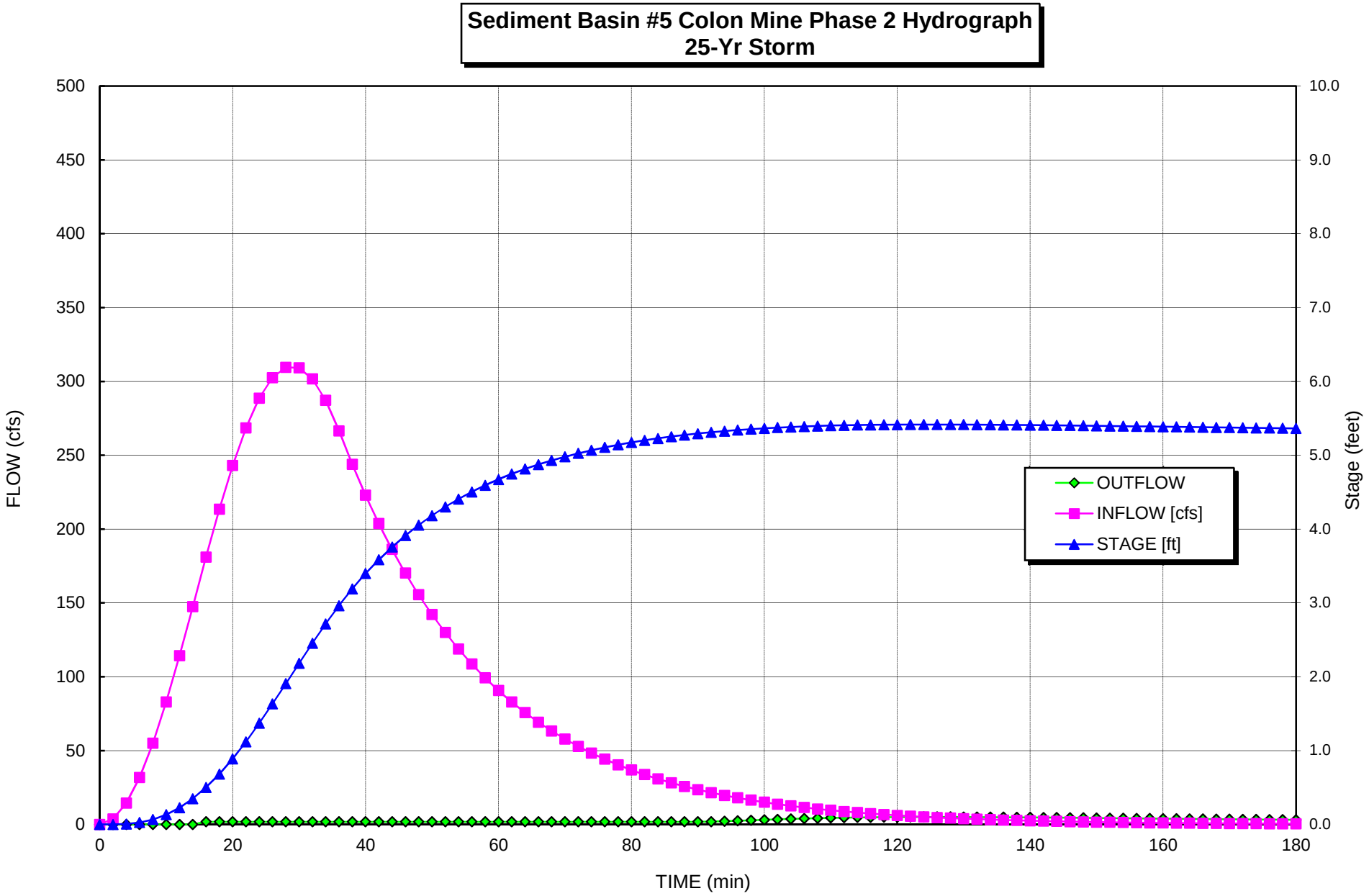
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.4	ft Maximum Stage	260.4	msl elevation
5.1	cfs Peak outflow		
5.1	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	3.6	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	14.4	438	0.0	0.00	0.00	0.00	0.00	0.00	170.80	77,638	N/A
6	31.8	2,169	0.0	0.00	0.00	0.00	0.00	0.00	196.06	89,120	N/A
8	55.0	5,987	0.1	0.00	0.00	0.00	0.00	0.00	214.00	97,273	N/A
10	82.9	12,588	0.1	0.00	0.00	0.00	0.00	0.00	228.16	103,709	N/A
12	114.2	22,538	0.2	0.00	0.00	0.00	0.00	0.00	239.91	109,049	N/A
14	147.4	36,244	0.3	0.00	0.00	0.00	0.00	0.00	249.94	113,608	N/A
16	181.0	53,937	0.5	0.88	0.88	0.00	0.88	1.77	258.65	117,569	100%
18	213.4	75,449	0.7	0.88	0.88	0.00	0.88	1.77	266.25	121,021	100%
20	243.0	100,845	0.9	0.88	0.88	0.00	0.88	1.77	272.99	124,086	100%
22	268.5	129,797	1.1	0.88	0.88	0.00	0.88	1.77	278.99	126,815	100%
24	288.7	161,808	1.4	0.88	0.88	0.00	0.88	1.77	284.35	129,248	100%
26	302.6	196,239	1.6	0.88	0.88	0.00	0.88	1.77	289.11	131,415	100%
28	309.5	232,336	1.9	0.88	0.88	0.00	0.88	1.77	293.35	133,342	100%
30	309.2	269,266	2.2	0.88	0.88	0.00	0.88	1.77	297.11	135,049	100%
32	301.6	306,158	2.5	0.88	0.88	0.00	0.88	1.77	300.41	136,552	100%
34	287.2	342,142	2.7	0.88	0.88	0.00	0.88	1.77	303.31	137,866	100%
36	266.5	376,392	3.0	0.88	0.88	0.00	0.88	1.77	305.81	139,005	100%
38	243.9	408,163	3.2	0.88	0.88	0.00	0.88	1.77	307.95	139,979	100%
40	222.9	437,221	3.4	0.88	0.88	0.00	0.88	1.77	309.79	140,812	100%
42	203.8	463,761	3.6	0.88	0.88	0.00	0.88	1.77	311.36	141,529	100%
44	186.2	488,001	3.8	0.88	0.88	0.00	0.88	1.77	312.73	142,152	100%
46	170.2	510,138	3.9	0.88	0.88	0.00	0.88	1.77	313.93	142,696	100%
48	155.6	530,353	4.1	0.88	0.88	0.00	0.88	1.77	314.99	143,175	100%
50	142.2	548,811	4.2	0.88	0.88	0.00	0.88	1.77	315.92	143,598	100%
52	130.0	565,664	4.3	0.88	0.88	0.00	0.88	1.77	316.74	143,973	100%
54	118.8	581,049	4.4	0.88	0.88	0.00	0.88	1.77	317.47	144,306	100%
56	108.6	595,093	4.5	0.88	0.88	0.00	0.88	1.77	318.13	144,604	100%
58	99.2	607,911	4.6	0.88	0.88	0.00	0.88	1.77	318.71	144,870	100%
60	90.7	619,608	4.7	0.88	0.88	0.00	0.88	1.77	319.24	145,108	100%
62	82.9	630,281	4.7	0.88	0.88	0.00	0.88	1.77	319.71	145,322	100%
64	75.8	640,019	4.8	0.88	0.88	0.00	0.88	1.77	320.13	145,514	100%
66	69.3	648,900	4.9	0.88	0.88	0.00	0.88	1.77	320.51	145,687	100%
68	63.3	656,999	4.9	0.88	0.88	0.00	0.88	1.77	320.85	145,843	100%
70	57.9	664,384	5.0	0.88	0.88	0.00	0.88	1.77	321.16	145,983	100%
72	52.9	671,115	5.0	0.88	0.88	0.00	0.88	1.77	321.44	146,110	100%
74	48.3	677,250	5.1	0.88	0.88	0.00	0.88	1.77	321.69	146,225	100%
76	44.2	682,838	5.1	0.88	0.88	0.00	0.88	1.77	321.92	146,329	100%
78	40.4	687,928	5.1	0.88	0.88	0.00	0.88	1.77	322.13	146,422	100%
80	36.9	692,562	5.2	0.88	0.88	0.00	0.88	1.77	322.32	146,507	100%
82	33.7	696,779	5.2	0.88	0.88	0.00	0.88	1.77	322.48	146,584	100%
84	30.8	700,615	5.2	0.88	0.88	0.00	0.88	1.77	322.64	146,653	100%

86	28.2	704,103	5.3	0.88	0.88	0.00	0.88	1.77	322.78	146,716	100%
88	25.8	707,273	5.3	0.88	0.88	0.00	0.88	1.77	322.90	146,773	100%
90	23.5	710,152	5.3	0.88	0.88	0.00	0.88	1.77	323.01	146,824	100%
92	21.5	712,765	5.3	0.88	0.93	0.00	31.36	1.86	323.12	146,871	100%
94	19.7	715,124	5.3	0.88	1.07	0.00	31.42	2.13	323.21	146,913	100%
96	18.0	717,228	5.3	0.88	1.23	0.00	31.47	2.46	323.29	146,950	100%
98	16.4	719,090	5.4	0.88	1.40	0.00	31.51	2.80	323.36	146,983	100%
100	15.0	720,725	5.4	0.88	1.57	0.00	31.55	3.14	323.43	147,011	100%
102	13.7	722,150	5.4	0.88	1.73	0.00	31.59	3.46	323.48	147,036	100%
104	12.5	723,382	5.4	0.88	1.88	0.00	31.62	3.75	323.53	147,058	100%
106	11.5	724,437	5.4	0.88	2.01	0.00	31.64	4.02	323.57	147,077	100%
108	10.5	725,332	5.4	0.88	2.12	0.00	31.67	4.25	323.60	147,092	100%
110	9.6	726,080	5.4	0.88	2.22	0.00	31.68	4.44	323.63	147,105	100%
112	8.8	726,696	5.4	0.88	2.31	0.00	31.70	4.61	323.66	147,116	100%
114	8.0	727,193	5.4	0.88	2.38	0.00	31.71	4.75	323.67	147,125	100%
116	7.3	727,583	5.4	0.88	2.43	0.00	31.72	4.86	323.69	147,131	100%
118	6.7	727,878	5.4	0.88	2.47	0.00	31.73	4.94	323.70	147,137	100%
120	6.1	728,087	5.4	0.88	2.50	0.00	31.73	5.00	323.71	147,140	100%
122	5.6	728,220	5.4	0.88	2.52	0.00	31.74	5.04	323.71	147,143	100%
124	5.1	728,285	5.4	0.88	2.53	0.00	31.74	5.06	323.72	147,144	100%
126	4.7	728,290	5.4	0.88	2.53	0.00	31.74	5.06	323.72	147,144	100%
128	4.3	728,243	5.4	0.88	2.52	0.00	31.74	5.05	323.71	147,143	100%
130	3.9	728,148	5.4	0.88	2.51	0.00	31.74	5.02	323.71	147,141	100%
132	3.6	728,014	5.4	0.88	2.49	0.00	31.73	4.98	323.71	147,139	100%
134	3.3	727,843	5.4	0.88	2.47	0.00	31.73	4.93	323.70	147,136	100%
136	3.0	727,642	5.4	0.88	2.44	0.00	31.72	4.88	323.69	147,132	100%
138	2.7	727,414	5.4	0.88	2.41	0.00	31.72	4.81	323.68	147,129	100%
140	2.5	727,163	5.4	0.88	2.37	0.00	31.71	4.74	323.67	147,124	100%
142	2.3	726,892	5.4	0.88	2.33	0.00	31.70	4.67	323.66	147,119	100%
144	2.1	726,605	5.4	0.88	2.29	0.00	31.70	4.59	323.65	147,114	100%
146	1.9	726,304	5.4	0.88	2.25	0.00	31.69	4.51	323.64	147,109	100%
148	1.7	725,991	5.4	0.88	2.21	0.00	31.68	4.42	323.63	147,104	100%
150	1.6	725,668	5.4	0.88	2.17	0.00	31.67	4.33	323.62	147,098	100%
152	1.4	725,339	5.4	0.88	2.12	0.00	31.67	4.25	323.60	147,092	100%
154	1.3	725,003	5.4	0.88	2.08	0.00	31.66	4.16	323.59	147,086	100%
156	1.2	724,662	5.4	0.88	2.04	0.00	31.65	4.07	323.58	147,080	100%
158	1.1	724,319	5.4	0.88	1.99	0.00	31.64	3.99	323.56	147,074	100%
160	1.0	723,974	5.4	0.88	1.95	0.00	31.63	3.90	323.55	147,068	100%
162	0.9	723,627	5.4	0.88	1.91	0.00	31.62	3.81	323.54	147,062	100%
164	0.8	723,281	5.4	0.88	1.86	0.00	31.62	3.73	323.52	147,056	100%
166	0.8	722,935	5.4	0.88	1.82	0.00	31.61	3.64	323.51	147,050	100%
168	0.7	722,590	5.4	0.88	1.78	0.00	31.60	3.56	323.50	147,044	100%
170	0.6	722,247	5.4	0.88	1.74	0.00	31.59	3.48	323.48	147,038	100%
172	0.6	721,907	5.4	0.88	1.70	0.00	31.58	3.40	323.47	147,032	100%
174	0.5	721,569	5.4	0.88	1.66	0.00	31.57	3.33	323.46	147,026	100%
176	0.5	721,235	5.4	0.88	1.63	0.00	31.57	3.25	323.44	147,020	100%
178	0.5	720,904	5.4	0.88	1.59	0.00	31.56	3.18	323.43	147,015	100%
180	0.4	720,576	5.4	0.88	1.55	0.00	31.55	3.11	323.42	147,009	100%
182	0.4	720,253	5.4	0.88	1.52	0.00	31.54	3.04	323.41	147,003	100%
184	0.3	719,933	5.4	0.88	1.49	0.00	31.53	2.97	323.39	146,997	100%
186	0.3	719,617	5.4	0.88	1.45	0.00	31.53	2.91	323.38	146,992	100%
188	0.3	719,306	5.4	0.88	1.42	0.00	31.52	2.85	323.37	146,986	100%
190	0.3	718,999	5.4	0.88	1.39	0.00	31.51	2.79	323.36	146,981	100%
192	0.2	718,696	5.4	0.88	1.36	0.00	31.50	2.73	323.35	146,976	100%
194	0.2	718,398	5.3	0.88	1.34	0.00	31.50	2.67	323.33	146,970	100%
196	0.2	718,103	5.3	0.88	1.31	0.00	31.49	2.62	323.32	146,965	100%
198	0.2	717,814	5.3	0.88	1.28	0.00	31.48	2.56	323.31	146,960	100%
200	0.2	717,528	5.3	0.88	1.26	0.00	31.47	2.51	323.30	146,955	100%
202	0.2	717,247	5.3	0.88	1.23	0.00	31.47	2.46	323.29	146,950	100%
204	0.1	716,969	5.3	0.88	1.21	0.00	31.46	2.42	323.28	146,945	100%
206	0.1	716,696	5.3	0.88	1.19	0.00	31.45	2.37	323.27	146,940	100%


Sediment Basin #5 Colon Mine Phase 2 Hydrograph
25-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Sediment Basin # 5 Colon

Phase 2

100 - year Storm Event

Qp =	402.1	cfs
Tp =	29.4	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.1

Ks = 114,650

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	3.3	(ft)	
Height of Riser from bottom of barrel=	5.3	(ft) elevation	260.30
Emergency Spillway =	6.0	(ft) elevation	261.00
Total Height of Dam =	7.0	(ft) elevation	262.00
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	48	(in)	
Permanent Pond Stage =	0	(ft) elevation	255.0

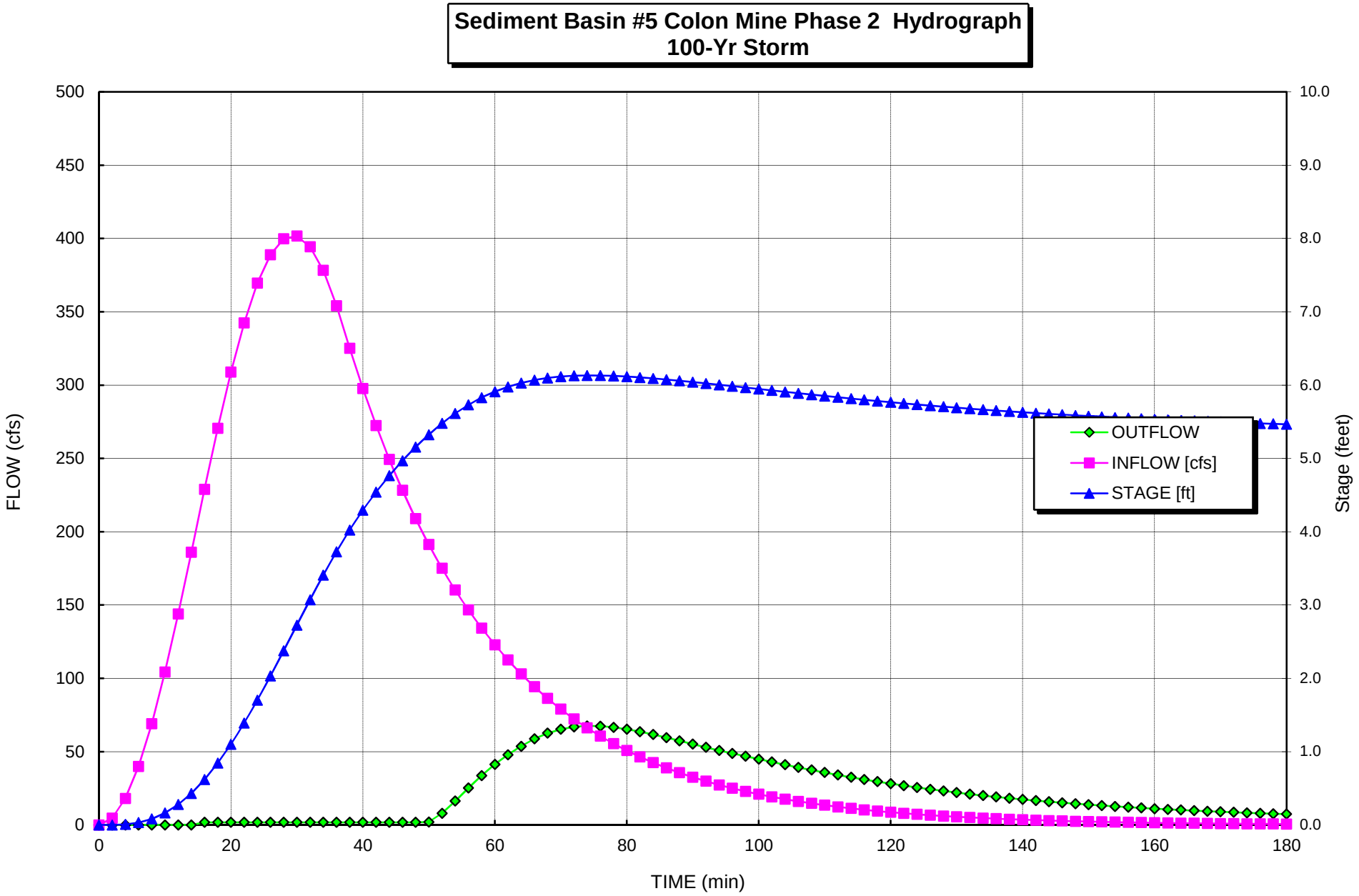
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
97%	Minimum Settling Efficiency		
6.1	ft Maximum Stage	261.1	msl elevation
67.5	cfs Peak outflow		
64.7	cfs Peak Riser/Barrel outflow		
2.9	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	4.6	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	18.1	549	0.0	0.00	0.00	0.00	0.00	0.00	174.16	79,166	N/A
6	39.9	2,719	0.0	0.00	0.00	0.00	0.00	0.00	199.93	90,876	N/A
8	69.1	7,511	0.1	0.00	0.00	0.00	0.00	0.00	218.23	99,193	N/A
10	104.3	15,802	0.2	0.00	0.00	0.00	0.00	0.00	232.68	105,762	N/A
12	143.8	28,315	0.3	0.00	0.00	0.00	0.00	0.00	244.67	111,216	N/A
14	186.0	45,576	0.4	0.00	0.00	0.00	0.00	0.00	254.92	115,874	N/A
16	228.9	67,900	0.6	0.88	0.88	0.00	0.88	1.77	263.84	119,926	100%
18	270.5	95,154	0.8	0.88	0.88	0.00	0.88	1.77	271.62	123,466	100%
20	308.9	127,401	1.1	0.88	0.88	0.00	0.88	1.77	278.55	126,611	100%
22	342.4	164,259	1.4	0.88	0.88	0.00	0.88	1.77	284.71	129,415	100%
24	369.5	205,141	1.7	0.88	0.88	0.00	0.88	1.77	290.22	131,919	100%
26	389.0	249,274	2.0	0.88	0.88	0.00	0.88	1.77	295.14	134,154	100%
28	399.8	295,737	2.4	0.88	0.88	0.00	0.88	1.77	299.52	136,145	100%
30	401.7	343,506	2.7	0.88	0.88	0.00	0.88	1.77	303.41	137,914	100%
32	394.4	391,494	3.1	0.88	0.88	0.00	0.88	1.77	306.85	139,477	100%
34	378.3	438,606	3.4	0.88	0.88	0.00	0.88	1.77	309.87	140,850	100%
36	354.1	483,786	3.7	0.88	0.88	0.00	0.88	1.77	312.50	142,045	100%
38	325.1	526,066	4.0	0.88	0.88	0.00	0.88	1.77	314.77	143,075	100%
40	297.6	564,868	4.3	0.88	0.88	0.00	0.88	1.77	316.70	143,956	100%
42	272.4	600,369	4.5	0.88	0.88	0.00	0.88	1.77	318.37	144,714	100%
44	249.4	632,846	4.8	0.88	0.88	0.00	0.88	1.77	319.82	145,373	100%
46	228.2	662,557	5.0	0.88	0.88	0.00	0.88	1.77	321.09	145,949	100%
48	208.9	689,735	5.2	0.88	0.88	0.00	0.88	1.77	322.20	146,455	100%
50	191.2	714,594	5.3	0.88	1.03	0.00	31.40	2.06	323.19	146,903	100%
52	175.1	737,297	5.5	0.88	3.99	0.00	31.96	7.97	324.06	147,300	100%
54	160.2	757,347	5.6	0.88	8.16	0.00	32.44	16.33	324.81	147,641	100%
56	146.7	774,616	5.7	0.88	12.59	0.00	32.85	25.19	325.44	147,928	99%
58	134.3	789,195	5.8	0.88	16.83	0.00	33.19	33.67	325.97	148,166	99%
60	122.9	801,267	5.9	0.88	20.66	0.00	33.47	41.31	326.39	148,360	99%
62	112.5	811,057	6.0	0.88	23.95	0.00	33.69	47.89	326.73	148,515	98%
64	103.0	818,810	6.0	0.88	26.67	0.29	33.87	53.62	327.00	148,637	98%
66	94.3	824,732	6.1	0.88	28.81	1.07	34.00	58.69	327.21	148,730	97%
68	86.3	829,001	6.1	0.88	30.39	1.81	34.10	62.59	327.35	148,796	97%
70	79.0	831,844	6.1	0.88	31.46	2.37	34.16	65.28	327.45	148,840	97%
72	72.3	833,487	6.1	0.88	32.08	2.72	34.20	66.88	327.50	148,865	97%
74	66.2	834,137	6.1	0.88	32.33	2.86	34.21	67.51	327.53	148,875	97%
76	60.6	833,976	6.1	0.88	32.26	2.83	34.21	67.35	327.52	148,873	97%
78	55.4	833,163	6.1	0.88	31.96	2.65	34.19	66.56	327.49	148,860	97%
80	50.8	831,829	6.1	0.88	31.45	2.37	34.16	65.27	327.45	148,840	97%
82	46.5	830,087	6.1	0.88	30.79	2.02	34.12	63.61	327.39	148,813	97%
84	42.5	828,029	6.1	0.88	30.03	1.63	34.07	61.69	327.32	148,781	97%

86	38.9	825,729	6.1	0.88	29.18	1.23	34.02	59.58	327.24	148,745	97%
88	35.6	823,250	6.1	0.88	28.27	0.85	33.97	57.38	327.15	148,707	97%
90	32.6	820,640	6.0	0.88	27.32	0.49	33.91	55.14	327.07	148,666	98%
92	29.9	817,938	6.0	0.88	26.36	0.20	33.85	52.91	326.97	148,624	98%
94	27.3	815,170	6.0	0.88	25.38	0.02	33.78	50.77	326.88	148,580	98%
96	25.0	812,357	6.0	0.88	24.40	0.00	33.72	48.79	326.78	148,536	98%
98	22.9	809,504	6.0	0.88	23.41	0.00	33.66	46.83	326.68	148,491	98%
100	21.0	806,633	5.9	0.88	22.44	0.00	33.59	44.88	326.58	148,445	98%
102	19.2	803,763	5.9	0.88	21.48	0.00	33.52	42.96	326.48	148,400	98%
104	17.6	800,910	5.9	0.88	20.54	0.00	33.46	41.08	326.38	148,354	99%
106	16.1	798,088	5.9	0.88	19.62	0.00	33.39	39.25	326.28	148,309	99%
108	14.7	795,307	5.9	0.88	18.74	0.00	33.33	37.47	326.18	148,265	99%
110	13.5	792,576	5.9	0.88	17.88	0.00	33.27	35.76	326.09	148,221	99%
112	12.3	789,902	5.8	0.88	17.05	0.00	33.20	34.10	325.99	148,177	99%
114	11.3	787,289	5.8	0.88	16.26	0.00	33.14	32.51	325.90	148,135	99%
116	10.3	784,742	5.8	0.88	15.49	0.00	33.08	30.99	325.81	148,094	99%
118	9.5	782,263	5.8	0.88	14.76	0.00	33.03	29.53	325.72	148,053	99%
120	8.7	779,855	5.8	0.88	14.07	0.00	32.97	28.14	325.63	148,014	99%
122	7.9	777,517	5.8	0.88	13.40	0.00	32.92	26.81	325.55	147,976	99%
124	7.3	775,251	5.7	0.88	12.77	0.00	32.86	25.54	325.46	147,939	99%
126	6.6	773,057	5.7	0.88	12.17	0.00	32.81	24.33	325.39	147,902	99%
128	6.1	770,933	5.7	0.88	11.59	0.00	32.76	23.18	325.31	147,867	99%
130	5.6	768,880	5.7	0.88	11.05	0.00	32.71	22.09	325.23	147,833	100%
132	5.1	766,897	5.7	0.88	10.53	0.00	32.67	21.06	325.16	147,800	100%
134	4.7	764,981	5.7	0.88	10.04	0.00	32.62	20.07	325.09	147,769	100%
136	4.3	763,131	5.7	0.88	9.57	0.00	32.58	19.14	325.02	147,738	100%
138	3.9	761,346	5.6	0.88	9.13	0.00	32.53	18.26	324.96	147,708	100%
140	3.6	759,624	5.6	0.88	8.71	0.00	32.49	17.42	324.89	147,679	100%
142	3.3	757,962	5.6	0.88	8.31	0.00	32.45	16.62	324.83	147,651	100%
144	3.0	756,360	5.6	0.88	7.93	0.00	32.42	15.87	324.77	147,624	100%
146	2.7	754,816	5.6	0.88	7.58	0.00	32.38	15.15	324.72	147,598	100%
148	2.5	753,327	5.6	0.88	7.24	0.00	32.34	14.47	324.66	147,573	100%
150	2.3	751,891	5.6	0.88	6.92	0.00	32.31	13.83	324.61	147,549	100%
152	2.1	750,507	5.6	0.88	6.61	0.00	32.28	13.22	324.56	147,525	100%
154	1.9	749,172	5.6	0.88	6.32	0.00	32.24	12.65	324.51	147,503	100%
156	1.8	747,885	5.5	0.88	6.05	0.00	32.21	12.10	324.46	147,481	100%
158	1.6	746,645	5.5	0.88	5.79	0.00	32.18	11.58	324.41	147,460	100%
160	1.5	745,449	5.5	0.88	5.55	0.00	32.15	11.09	324.37	147,439	100%
162	1.4	744,295	5.5	0.88	5.31	0.00	32.13	10.62	324.32	147,420	100%
164	1.2	743,182	5.5	0.88	5.09	0.00	32.10	10.18	324.28	147,401	100%
166	1.1	742,109	5.5	0.88	4.88	0.00	32.07	9.76	324.24	147,382	100%
168	1.0	741,073	5.5	0.88	4.68	0.00	32.05	9.37	324.20	147,365	100%
170	0.9	740,073	5.5	0.88	4.49	0.00	32.03	8.99	324.16	147,347	100%
172	0.9	739,108	5.5	0.88	4.32	0.00	32.00	8.63	324.13	147,331	100%
174	0.8	738,177	5.5	0.88	4.15	0.00	31.98	8.29	324.09	147,315	100%
176	0.7	737,277	5.5	0.88	3.98	0.00	31.96	7.97	324.06	147,299	100%
178	0.7	736,409	5.5	0.88	3.83	0.00	31.94	7.66	324.03	147,284	100%
180	0.6	735,569	5.5	0.88	3.69	0.00	31.92	7.37	323.99	147,270	100%
182	0.6	734,758	5.5	0.88	3.55	0.00	31.90	7.09	323.96	147,256	100%
184	0.5	733,974	5.5	0.88	3.42	0.00	31.88	6.83	323.93	147,242	100%
186	0.5	733,215	5.4	0.88	3.29	0.00	31.86	6.58	323.90	147,229	100%
188	0.4	732,482	5.4	0.88	3.17	0.00	31.84	6.34	323.88	147,217	100%
190	0.4	731,772	5.4	0.88	3.06	0.00	31.82	6.12	323.85	147,204	100%
192	0.4	731,085	5.4	0.88	2.95	0.00	31.81	5.90	323.82	147,192	100%
194	0.3	730,420	5.4	0.88	2.85	0.00	31.79	5.69	323.80	147,181	100%
196	0.3	729,776	5.4	0.88	2.75	0.00	31.78	5.50	323.77	147,170	100%
198	0.3	729,152	5.4	0.88	2.66	0.00	31.76	5.31	323.75	147,159	100%
200	0.3	728,548	5.4	0.88	2.57	0.00	31.75	5.14	323.73	147,148	100%
202	0.2	727,962	5.4	0.88	2.48	0.00	31.73	4.97	323.70	147,138	100%
204	0.2	727,393	5.4	0.88	2.40	0.00	31.72	4.81	323.68	147,128	100%


Sediment Basin #5 Colon Mine Phase 2 Hydrograph
100-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #6	Sheet: 1	Of: 4

Objective Design the temporary sediment basin to contain the 25-year storm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. NOAA Atlas 14, Volume 2, Version 3
4. VA Erosion and Sediment Control Handbook

Given

Phase	1	1		
Storm Event (yrs) =	10	25		
Total Drainage Area A (ac) =	15.3	15.3		
Disturbed Area (ac) =	15.3	15.3		
Curve Number CN =	89	89	Hydrographs	
Rainfall Depth P (in) =	5.28	6.28	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	93.60	114.53	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	27,540	cf
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	49,821	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
249	0	30,723	-	-	-
250	1	34,084	32,389	32,389	1,200
251	2	37,519	35,788	68,177	2,525
252	3	41,027	39,260	107,437	3,979
253	4	44,808	42,904	150,340	5,568
254	5	48,997	46,887	197,227	7,305
255	6	52,981	50,976	248,203	9,193

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 107,437 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 41,027 *Increase Surface Area*

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #6	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	107,437		
Number of Skimmers	1		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	21,487		0.25 cfs
Selected Skimmer Size (inches) =	5		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	4.0		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	1
Storm Event (yrs) =	10	25
S =	1.24	1.24
Runoff Depth Q* (inches) =	4.04	5.01
Time to Peak T_p (min) =	28.75	29.11

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	107,437
Z_2 (ft) =	5	S_2 (cf) =	197,227

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.2 Ref 2, III-8

$K_S = S_2/Z_2^{\,b}$ = 29,092

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #6	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor = 3.281 ft/sec per m/sec

Gravitational Acceleration, g (m/s^2) = 9.81

Specific Gravity of soil (s_s) = 2.6

Kinematic Viscosity of water (υ) = 1.14E-06 n^2 / sec @ 20° C — Ref 2, IV-11

Diameter of the Design Particle d_{15} = 40.00E-06 m

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / \upsilon] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 6.10

Set Top of Dam at (ft) = 7.00

See Hydrograph

Anti-Seep Collar:

Anti-Seep Collar Size = 2 * Barrel Dia

Anti-Seep Collar Size (ft) = 2

Use Anti-Seep Collar Size (ft) = 2 x 2

Minimum Concrete Base for Riser:

Diameter of Riser (in) = 18 From Hydrograph

Avg Density of Concrete (lbs/cf) = 87.6

Density of Water (lbs/cf) = 62.4

Riser Displacement (cf) = 8.84 Pi * $(D_R/24)^2$ * Total Ht of Riser

Convert cf to cy = 27^{-1}

Min Concrete Needed (cy) = 0.23

Width & Length (ft) = 2.5

Thickness (ft) = 1.0

Anti-Vortex Device:

Diameter of Riser (in) = 18 From Hydrograph

Cylinder Diameter (in) = 27 — Ref 4, III-104, Table 3.14-D

Cylinder Thickness (gage) = 16

Cylinder Height (in) = 8

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #6	Sheet: 4	Of: 4

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	3	3 * Barrel Diameter
Q_B (cfs) =	3.6	Peak Flow out of the barrel 10-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
3.6	1.18	0.47	2.5	0.32	1.18	1.4

Flow Depth = Tailwater, d (ft) = 0.47 0.5* Barrel Diameter (ft) = 0.50 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
1	3	8	9	0.3	Class A

Conclusion

The temporary basin can contain the 25-yr storm.

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet: 1	Of: 2

Diameter of Riser (in) =	18	
Circumference of Riser (in) =	56.5	
Height of Riser from bottom of barrel (in) =	60	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	1	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.25	0.25
0.39	0.00	0.00	0.00			0.25	0.25
0.44	0.00	0.00	0.00			0.25	0.25
0.49	0.00	0.00	0.00			0.25	0.25
0.54	0.00	0.00	0.00			0.25	0.25
0.59	0.00	0.00	0.00			0.25	0.25
0.64	0.00	0.00	0.00			0.25	0.25
0.69	0.00	0.00	0.00			0.25	0.25
0.74	0.00	0.00	0.00			0.25	0.25
0.79	0.00	0.00	0.00			0.25	0.25
0.84	0.00	0.00	0.00			0.25	0.25
0.89	0.00	0.00	0.00			0.25	0.25
0.94	0.00	0.00	0.00			0.25	0.25
0.99	0.00	0.00	0.00			0.25	0.25
1.04	0.00	0.00	0.00			0.25	0.25
1.09	0.00	0.00	0.00			0.25	0.25
1.14	0.00	0.00	0.00			0.25	0.25
1.19	0.00	0.00	0.00			0.25	0.25
1.24	0.00	0.00	0.00			0.25	0.25
1.29	0.00	0.00	0.00			0.25	0.25
1.34	0.00	0.00	0.00			0.25	0.25
1.39	0.00	0.00	0.00			0.25	0.25
1.44	0.00	0.00	0.00			0.25	0.25
1.49	0.00	0.00	0.00			0.25	0.25
1.54	0.00	0.00	0.00			0.25	0.25
1.59	0.00	0.00	0.00			0.25	0.25

1.64	0.00	0.00	0.00	0.25	0.25
1.69	0.00	0.00	0.00	0.25	0.25
1.74	0.00	0.00	0.00	0.25	0.25
1.79	0.00	0.00	0.00	0.25	0.25
1.84	0.00	0.00	0.00	0.25	0.25
1.89	0.00	0.00	0.00	0.25	0.25
1.94	0.00	0.00	0.00	0.25	0.25
1.99	0.00	0.00	0.00	0.25	0.25
2.04	0.00	0.00	0.00	0.25	0.25
2.09	0.00	0.00	0.00	0.25	0.25
2.14	0.00	0.00	0.00	0.25	0.25
2.19	0.00	0.00	0.00	0.25	0.25
2.24	0.00	0.00	0.00	0.25	0.25
2.29	0.00	0.00	0.00	0.25	0.25
2.34	0.00	0.00	0.00	0.25	0.25
2.39	0.00	0.00	0.00	0.25	0.25
2.44	0.00	0.00	0.00	0.25	0.25
2.49	0.00	0.00	0.00	0.25	0.25
2.54	0.00	0.00	0.00	0.25	0.25
2.59	0.00	0.00	0.00	0.25	0.25
2.64	0.00	0.00	0.00	0.25	0.25
2.69	0.00	0.00	0.00	0.25	0.25
2.74	0.00	0.00	0.00	0.25	0.25
2.79	0.00	0.00	0.00	0.25	0.25
2.84	0.00	0.00	0.00	0.25	0.25
2.89	0.00	0.00	0.00	0.25	0.25
2.94	0.00	0.00	0.00	0.25	0.25
2.99	0.00	0.00	0.00	0.25	0.25
3.04	0.00	0.00	0.00	0.25	0.25
3.09	0.00	0.00	0.00	0.25	0.25
3.14	0.00	0.00	0.00	0.25	0.25
3.19	0.00	0.00	0.00	0.25	0.25
3.24	0.00	0.00	0.00	0.25	0.25
3.29	0.00	0.00	0.00	0.25	0.25
3.34	0.00	0.00	0.00	0.25	0.25
3.39	0.00	0.00	0.00	0.25	0.25
3.44	0.00	0.00	0.00	0.25	0.25
3.49	0.00	0.00	0.00	0.25	0.25
3.54	0.00	0.00	0.00	0.25	0.25
3.59	0.00	0.00	0.00	0.25	0.25
3.64	0.00	0.00	0.00	0.25	0.25
3.69	0.00	0.00	0.00	0.25	0.25
3.74	0.00	0.00	0.00	0.25	0.25
3.79	0.00	0.00	0.00	0.25	0.25
3.84	0.00	0.00	0.00	0.25	0.25
3.89	0.00	0.00	0.00	0.25	0.25
3.94	0.00	0.00	0.00	0.25	0.25
3.99	0.00	0.00	0.00	0.25	0.25

Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: _1__of _2__

Qp = 93.60 cfs

Tp = 28.75 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 6 Colon

Phase 1

10 - year Storm Event

b = 1.2

K_s = 29,092

Number of Riser/Barrel Assemblies	1			
Diameter of Barrel =	12	(in)		
Height of Riser above barrel =	4.0	(ft)		
Height of Riser from bottom of barrel=	5.0	(ft) elevation	254.00	
Emergency Spillway =	6.1	(ft) elevation	255.10	
Total Height of Dam =	7.0	(ft) elevation	256.00	
Length of Emergency Spillway =	10	(ft)		
Diameter of Riser =	18	(in)		
Permanent Pond Stage =	0	(ft) elevation	249.0	

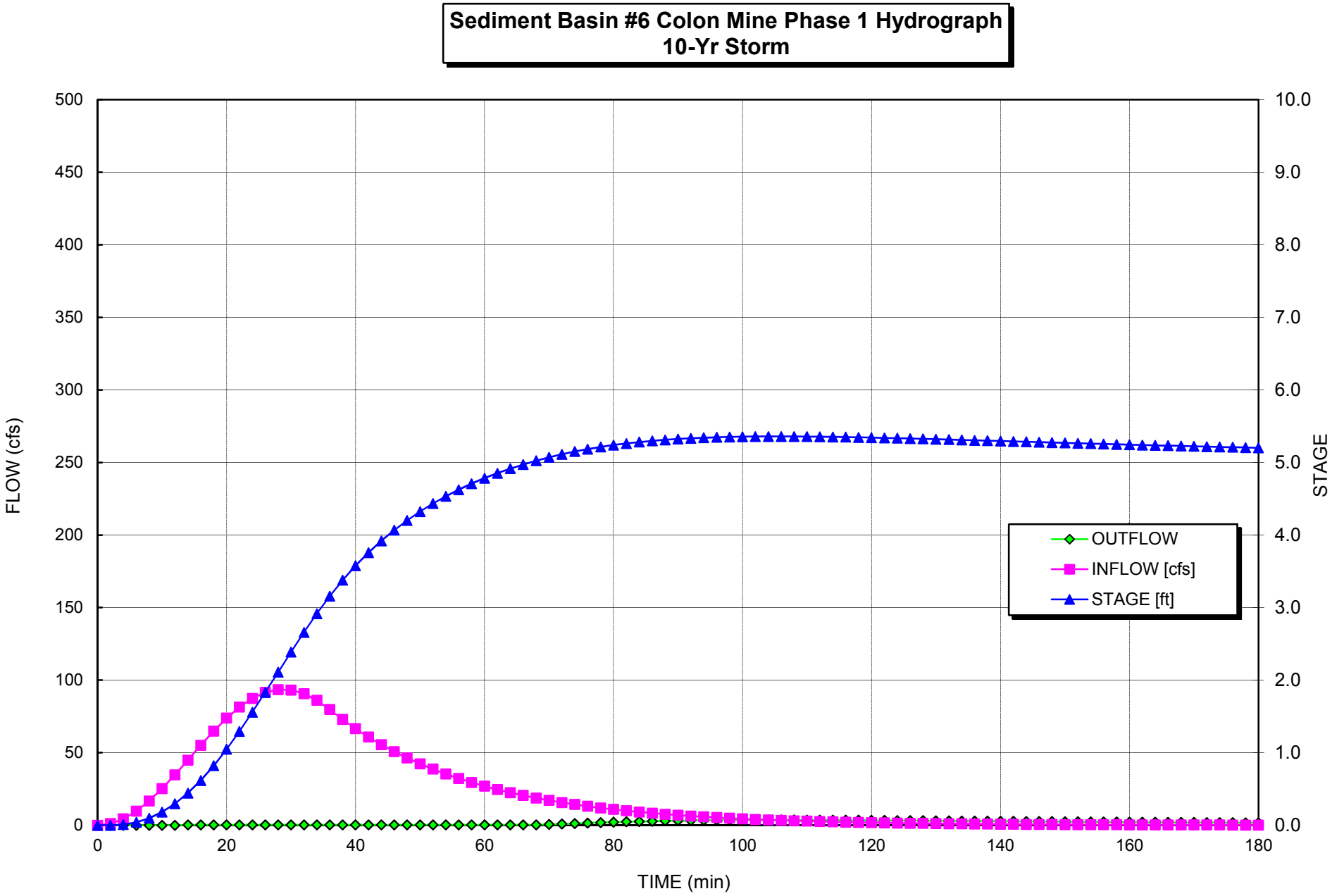
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.4	ft Maximum Stage	254.36	msl elevation
3.6	cfs Peak outflow		
3.6	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.1	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	4.4	134	0.0	0.00	0.00	0.00	0.00	0.00	32.33	14,693	N/A
6	9.7	662	0.0	0.00	0.00	0.00	0.00	0.00	41.69	18,952	N/A
8	16.8	1,826	0.1	0.00	0.00	0.00	0.00	0.00	49.00	22,273	N/A
10	25.3	3,839	0.2	0.00	0.00	0.00	0.00	0.00	55.15	25,068	N/A
12	34.8	6,872	0.3	0.00	0.00	0.00	0.00	0.00	60.50	27,500	N/A
14	44.9	11,048	0.4	0.25	0.25	0.00	0.25	0.25	65.25	29,657	100%
16	55.1	16,405	0.6	0.25	0.25	0.00	0.25	0.25	69.48	31,582	100%
18	64.9	22,984	0.8	0.25	0.25	0.00	0.25	0.25	73.31	33,322	100%
20	73.8	30,738	1.0	0.25	0.25	0.00	0.25	0.25	76.78	34,900	100%
22	81.4	39,564	1.3	0.25	0.25	0.00	0.25	0.25	79.92	36,329	100%
24	87.4	49,307	1.6	0.25	0.25	0.00	0.25	0.25	82.77	37,624	100%
26	91.5	59,770	1.8	0.25	0.25	0.00	0.25	0.25	85.35	38,794	100%
28	93.4	70,721	2.1	0.25	0.25	0.00	0.25	0.25	87.66	39,846	100%
30	93.2	81,905	2.4	0.25	0.25	0.00	0.25	0.25	89.73	40,787	100%
32	90.7	93,054	2.7	0.25	0.25	0.00	0.25	0.25	91.57	41,624	100%
34	86.1	103,905	2.9	0.25	0.25	0.00	0.25	0.25	93.19	42,361	100%
36	79.8	114,207	3.2	0.25	0.25	0.00	0.25	0.25	94.61	43,003	100%
38	72.9	123,747	3.4	0.25	0.25	0.00	0.25	0.25	95.82	43,555	100%
40	66.6	132,460	3.6	0.25	0.25	0.00	0.25	0.25	96.86	44,029	100%
42	60.8	140,417	3.8	0.25	0.25	0.00	0.25	0.25	97.77	44,439	100%
44	55.5	147,683	3.9	0.25	0.25	0.00	0.25	0.25	98.55	44,797	100%
46	50.7	154,318	4.1	0.25	0.25	0.00	0.25	0.25	99.25	45,112	100%
48	46.4	160,377	4.2	0.25	0.25	0.00	0.25	0.25	99.86	45,389	100%
50	42.3	165,910	4.3	0.25	0.25	0.00	0.25	0.25	100.40	45,634	100%
52	38.7	170,961	4.4	0.25	0.25	0.00	0.25	0.25	100.88	45,853	100%
54	35.3	175,573	4.5	0.25	0.25	0.00	0.25	0.25	101.30	46,047	100%
56	32.3	179,784	4.6	0.25	0.25	0.00	0.25	0.25	101.69	46,221	100%
58	29.5	183,627	4.7	0.25	0.25	0.00	0.25	0.25	102.03	46,377	100%
60	26.9	187,136	4.8	0.25	0.25	0.00	0.25	0.25	102.34	46,517	100%
62	24.6	190,339	4.9	0.25	0.25	0.00	0.25	0.25	102.61	46,643	100%
64	22.5	193,263	4.9	0.25	0.25	0.00	0.25	0.25	102.86	46,756	100%
66	20.5	195,931	5.0	0.25	0.25	0.00	0.25	0.25	103.09	46,858	100%
68	18.8	198,365	5.0	0.25	0.31	0.00	8.03	0.31	103.29	46,950	100%
70	17.1	200,580	5.1	0.25	0.55	0.00	8.07	0.55	103.47	47,033	100%
72	15.7	202,571	5.1	0.25	0.84	0.00	8.11	0.84	103.64	47,107	100%
74	14.3	204,349	5.2	0.25	1.16	0.00	8.14	1.16	103.78	47,172	100%
76	13.1	205,925	5.2	0.25	1.48	0.00	8.17	1.48	103.91	47,230	100%
78	11.9	207,315	5.2	0.25	1.79	0.00	8.20	1.79	104.02	47,281	100%
80	10.9	208,533	5.2	0.25	2.08	0.00	8.22	2.08	104.11	47,325	100%
82	10.0	209,592	5.3	0.25	2.34	0.00	8.24	2.34	104.20	47,363	100%

84	9.1	210,507	5.3	0.25	2.57	0.00	8.26	2.57	104.27	47,396	100%
86	8.3	211,290	5.3	0.25	2.78	0.00	8.27	2.78	104.33	47,424	100%
88	7.6	211,954	5.3	0.25	2.96	0.00	8.28	2.96	104.38	47,447	100%
90	6.9	212,510	5.3	0.25	3.11	0.00	8.29	3.11	104.43	47,467	100%
92	6.3	212,969	5.3	0.25	3.24	0.00	8.30	3.24	104.46	47,484	100%
94	5.8	213,340	5.3	0.25	3.35	0.00	8.31	3.35	104.49	47,497	100%
96	5.3	213,633	5.3	0.25	3.43	0.00	8.31	3.43	104.52	47,507	100%
98	4.8	213,855	5.4	0.25	3.50	0.00	8.32	3.50	104.53	47,515	100%
100	4.4	214,015	5.4	0.25	3.55	0.00	8.32	3.55	104.55	47,521	100%
102	4.0	214,119	5.4	0.25	3.58	0.00	8.32	3.58	104.55	47,524	100%
104	3.7	214,174	5.4	0.25	3.59	0.00	8.32	3.59	104.56	47,526	100%
106	3.4	214,185	5.4	0.25	3.60	0.00	8.32	3.60	104.56	47,527	100%
108	3.1	214,157	5.4	0.25	3.59	0.00	8.32	3.59	104.56	47,526	100%
110	2.8	214,096	5.4	0.25	3.57	0.00	8.32	3.57	104.55	47,523	100%
112	2.6	214,004	5.4	0.25	3.54	0.00	8.32	3.54	104.54	47,520	100%
114	2.3	213,887	5.4	0.25	3.51	0.00	8.32	3.51	104.54	47,516	100%
116	2.1	213,747	5.3	0.25	3.47	0.00	8.31	3.47	104.52	47,511	100%
118	2.0	213,588	5.3	0.25	3.42	0.00	8.31	3.42	104.51	47,505	100%
120	1.8	213,412	5.3	0.25	3.37	0.00	8.31	3.37	104.50	47,499	100%
122	1.6	213,222	5.3	0.25	3.32	0.00	8.31	3.32	104.48	47,493	100%
124	1.5	213,020	5.3	0.25	3.26	0.00	8.30	3.26	104.47	47,485	100%
126	1.4	212,808	5.3	0.25	3.20	0.00	8.30	3.20	104.45	47,478	100%
128	1.2	212,588	5.3	0.25	3.14	0.00	8.29	3.14	104.43	47,470	100%
130	1.1	212,360	5.3	0.25	3.07	0.00	8.29	3.07	104.42	47,462	100%
132	1.0	212,128	5.3	0.25	3.01	0.00	8.29	3.01	104.40	47,454	100%
134	0.9	211,892	5.3	0.25	2.94	0.00	8.28	2.94	104.38	47,445	100%
136	0.9	211,652	5.3	0.25	2.88	0.00	8.28	2.88	104.36	47,437	100%
138	0.8	211,411	5.3	0.25	2.81	0.00	8.27	2.81	104.34	47,428	100%
140	0.7	211,168	5.3	0.25	2.75	0.00	8.27	2.75	104.32	47,419	100%
142	0.7	210,925	5.3	0.25	2.68	0.00	8.26	2.68	104.30	47,411	100%
144	0.6	210,683	5.3	0.25	2.62	0.00	8.26	2.62	104.28	47,402	100%
146	0.6	210,441	5.3	0.25	2.56	0.00	8.26	2.56	104.27	47,393	100%
148	0.5	210,200	5.3	0.25	2.49	0.00	8.25	2.49	104.25	47,385	100%
150	0.5	209,962	5.3	0.25	2.43	0.00	8.25	2.43	104.23	47,376	100%
152	0.4	209,725	5.3	0.25	2.37	0.00	8.24	2.37	104.21	47,368	100%
154	0.4	209,491	5.3	0.25	2.31	0.00	8.24	2.31	104.19	47,359	100%
156	0.4	209,259	5.3	0.25	2.25	0.00	8.23	2.25	104.17	47,351	100%
158	0.3	209,031	5.3	0.25	2.20	0.00	8.23	2.20	104.15	47,343	100%
160	0.3	208,806	5.2	0.25	2.14	0.00	8.23	2.14	104.14	47,335	100%
162	0.3	208,584	5.2	0.25	2.09	0.00	8.22	2.09	104.12	47,327	100%
164	0.2	208,365	5.2	0.25	2.04	0.00	8.22	2.04	104.10	47,319	100%
166	0.2	208,150	5.2	0.25	1.98	0.00	8.21	1.98	104.08	47,311	100%
168	0.2	207,939	5.2	0.25	1.93	0.00	8.21	1.93	104.07	47,303	100%
170	0.2	207,731	5.2	0.25	1.89	0.00	8.21	1.89	104.05	47,296	100%
172	0.2	207,527	5.2	0.25	1.84	0.00	8.20	1.84	104.03	47,288	100%
174	0.2	207,327	5.2	0.25	1.79	0.00	8.20	1.79	104.02	47,281	100%
176	0.1	207,130	5.2	0.25	1.75	0.00	8.19	1.75	104.00	47,274	100%
178	0.1	206,937	5.2	0.25	1.70	0.00	8.19	1.70	103.99	47,267	100%
180	0.1	206,748	5.2	0.25	1.66	0.00	8.19	1.66	103.97	47,260	100%
182	0.1	206,563	5.2	0.25	1.62	0.00	8.18	1.62	103.96	47,253	100%
184	0.1	206,381	5.2	0.25	1.58	0.00	8.18	1.58	103.94	47,247	100%
186	0.1	206,203	5.2	0.25	1.54	0.00	8.18	1.54	103.93	47,240	100%
188	0.1	206,029	5.2	0.25	1.51	0.00	8.17	1.51	103.91	47,234	100%
190	0.1	205,858	5.2	0.25	1.47	0.00	8.17	1.47	103.90	47,228	100%
192	0.1	205,691	5.2	0.25	1.43	0.00	8.17	1.43	103.89	47,222	100%
194	0.1	205,527	5.2	0.25	1.40	0.00	8.16	1.40	103.87	47,216	100%
196	0.1	205,366	5.2	0.25	1.37	0.00	8.16	1.37	103.86	47,210	100%
198	0.1	205,209	5.2	0.25	1.34	0.00	8.16	1.34	103.85	47,204	100%
200	0.0	205,055	5.2	0.25	1.30	0.00	8.16	1.30	103.84	47,198	100%
202	0.0	204,905	5.2	0.25	1.27	0.00	8.15	1.27	103.82	47,193	100%
204	0.0	204,757	5.2	0.25	1.24	0.00	8.15	1.24	103.81	47,187	100%
206	0.0	204,612	5.2	0.25	1.22	0.00	8.15	1.22	103.80	47,182	100%


Sediment Basin #6 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: _1__of _2__

Qp = 114.53 cfs

Tp = 29.11 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 6 Colon

Phase 1

25 - year Storm Event

b = 1.2

K_s = 29,092

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	12	(in)	
Height of Riser above barrel =	4	(ft)	
Height of Riser from bottom of barrel=	5	(ft) elevation	254.00
Emergency Spillway =	6.1	(ft) elevation	255.10
Total Height of Dam =	7	(ft) elevation	256.00
Length of Emergency Spillway =	10	(ft)	
Diameter of Riser =	18	(in)	
Permanent Pond Stage =	0	(ft) elevation	249.0

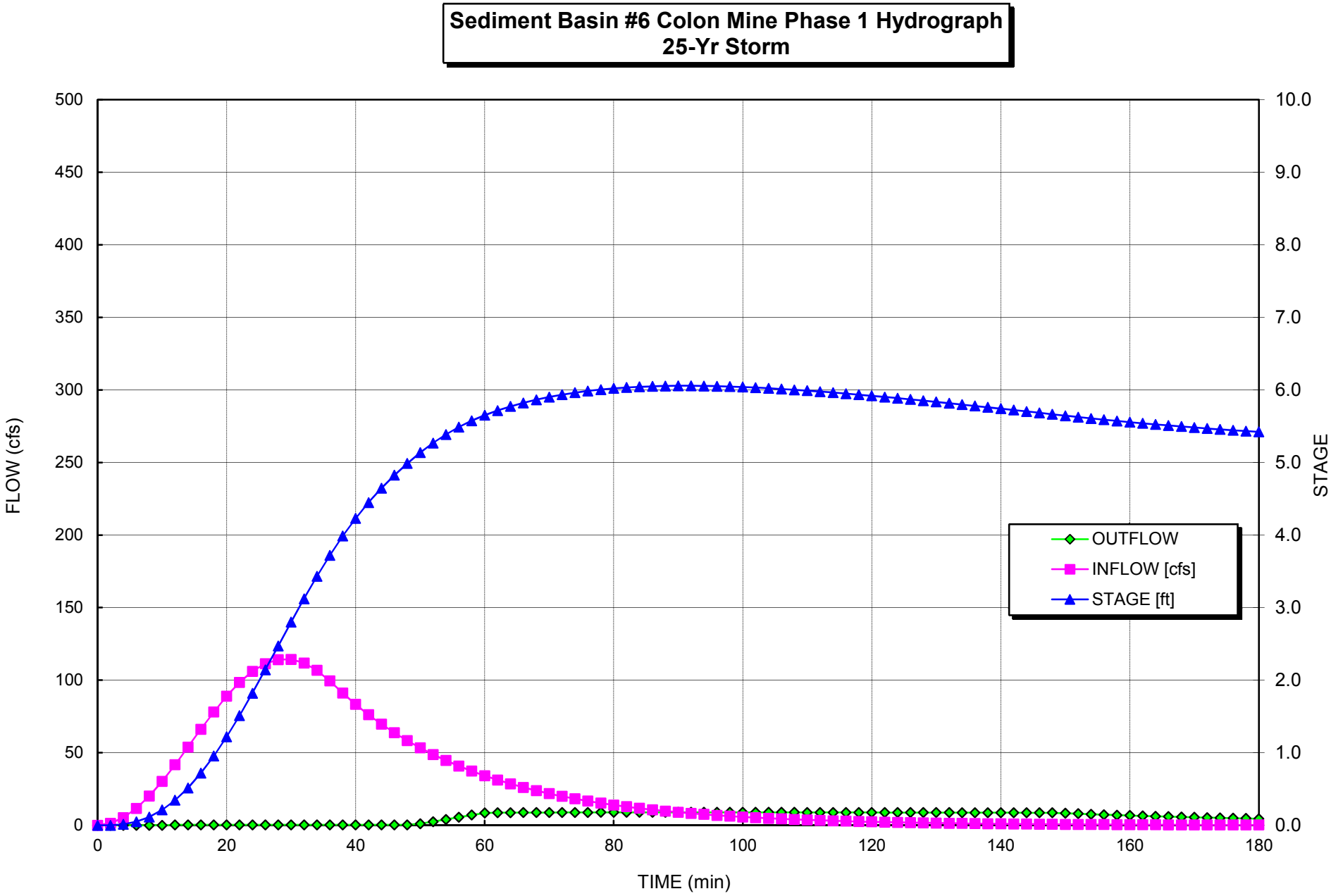
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
99%	Minimum Settling Efficiency		
6.1	ft Maximum Stage	255.06	msl elevation
8.9	cfs Peak outflow		
8.9	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	5.3	159	0.0	0.00	0.00	0.00	0.00	0.00	33.25	15,112	N/A
6	11.6	790	0.0	0.00	0.00	0.00	0.00	0.00	42.88	19,492	N/A
8	20.0	2,180	0.1	0.00	0.00	0.00	0.00	0.00	50.40	22,910	N/A
10	30.2	4,586	0.2	0.00	0.00	0.00	0.00	0.00	56.73	25,786	N/A
12	41.7	8,213	0.3	0.25	0.25	0.00	0.25	0.25	62.24	28,291	100%
14	53.8	13,183	0.5	0.25	0.25	0.00	0.25	0.25	67.11	30,503	100%
16	66.1	19,613	0.7	0.25	0.25	0.00	0.25	0.25	71.48	32,492	100%
18	78.1	27,521	1.0	0.25	0.25	0.00	0.25	0.25	75.44	34,291	100%
20	89.0	36,858	1.2	0.25	0.25	0.00	0.25	0.25	79.03	35,922	100%
22	98.5	47,508	1.5	0.25	0.25	0.00	0.25	0.25	82.29	37,402	100%
24	106.0	59,295	1.8	0.25	0.25	0.00	0.25	0.25	85.24	38,745	100%
26	111.3	71,989	2.1	0.25	0.25	0.00	0.25	0.25	87.91	39,959	100%
28	114.1	85,318	2.5	0.25	0.25	0.00	0.25	0.25	90.32	41,053	100%
30	114.3	98,983	2.8	0.25	0.25	0.00	0.25	0.25	92.48	42,035	100%
32	111.8	112,665	3.1	0.25	0.25	0.00	0.25	0.25	94.40	42,910	100%
34	106.8	126,048	3.4	0.25	0.25	0.00	0.25	0.25	96.10	43,683	100%
36	99.4	138,828	3.7	0.25	0.25	0.00	0.25	0.25	97.59	44,359	100%
38	91.1	150,730	4.0	0.25	0.25	0.00	0.25	0.25	98.87	44,943	100%
40	83.3	161,632	4.2	0.25	0.25	0.00	0.25	0.25	99.98	45,445	100%
42	76.2	171,599	4.4	0.25	0.25	0.00	0.25	0.25	100.94	45,880	100%
44	69.7	180,713	4.6	0.25	0.25	0.00	0.25	0.25	101.77	46,259	100%
46	63.7	189,045	4.8	0.25	0.25	0.00	0.25	0.25	102.50	46,592	100%
48	58.3	196,663	5.0	0.25	0.25	0.00	0.25	0.25	103.15	46,886	100%
50	53.3	203,627	5.1	0.25	1.03	0.00	8.13	1.03	103.72	47,146	100%
52	48.8	209,900	5.3	0.25	2.42	0.00	8.25	2.42	104.22	47,374	100%
54	44.6	215,461	5.4	0.25	3.98	0.00	8.35	3.98	104.66	47,571	100%
56	40.8	220,334	5.5	0.25	5.55	0.00	8.43	5.55	105.03	47,741	100%
58	37.3	224,561	5.6	0.25	7.06	0.00	8.51	7.06	105.35	47,886	100%
60	34.1	228,189	5.7	0.25	8.44	0.00	8.57	8.44	105.62	48,008	99%
62	31.2	231,269	5.7	0.25	9.68	0.00	8.62	8.62	105.84	48,110	99%
64	28.5	233,977	5.8	0.25	10.81	0.00	8.67	8.67	106.04	48,199	99%
66	26.1	236,360	5.8	0.25	11.84	0.00	8.71	8.71	106.21	48,277	99%
68	23.9	238,446	5.9	0.25	12.76	0.00	8.75	8.75	106.36	48,345	99%
70	21.8	240,260	5.9	0.25	13.59	0.00	8.78	8.78	106.49	48,403	99%
72	20.0	241,826	5.9	0.25	14.31	0.00	8.80	8.80	106.60	48,453	99%
74	18.3	243,165	6.0	0.25	14.94	0.00	8.82	8.82	106.69	48,496	99%
76	16.7	244,296	6.0	0.25	15.47	0.00	8.84	8.84	106.77	48,532	99%
78	15.3	245,238	6.0	0.25	15.93	0.00	8.86	8.86	106.83	48,561	99%
80	14.0	246,007	6.0	0.25	16.30	0.00	8.87	8.87	106.89	48,585	99%
82	12.8	246,618	6.0	0.25	16.59	0.00	8.88	8.88	106.93	48,605	99%

84	11.7	247,085	6.0	0.25	16.82	0.00	8.89	8.89	106.96	48,619	99%
86	10.7	247,420	6.1	0.25	16.99	0.00	8.90	8.90	106.99	48,630	99%
88	9.8	247,634	6.1	0.25	17.09	0.00	8.90	8.90	107.00	48,636	99%
90	8.9	247,739	6.1	0.25	17.14	0.00	8.90	8.90	107.01	48,640	99%
92	8.2	247,743	6.1	0.25	17.15	0.00	8.90	8.90	107.01	48,640	99%
94	7.5	247,655	6.1	0.25	17.10	0.00	8.90	8.90	107.00	48,637	99%
96	6.8	247,484	6.1	0.25	17.02	0.00	8.90	8.90	106.99	48,632	99%
98	6.3	247,237	6.0	0.25	16.90	0.00	8.89	8.89	106.97	48,624	99%
100	5.7	246,920	6.0	0.25	16.74	0.00	8.89	8.89	106.95	48,614	99%
102	5.2	246,540	6.0	0.25	16.56	0.00	8.88	8.88	106.92	48,602	99%
104	4.8	246,101	6.0	0.25	16.34	0.00	8.87	8.87	106.89	48,588	99%
106	4.4	245,610	6.0	0.25	16.10	0.00	8.87	8.87	106.86	48,573	99%
108	4.0	245,071	6.0	0.25	15.84	0.00	8.86	8.86	106.82	48,556	99%
110	3.7	244,488	6.0	0.25	15.57	0.00	8.85	8.85	106.78	48,538	99%
112	3.3	243,866	6.0	0.25	15.27	0.00	8.84	8.84	106.74	48,518	99%
114	3.1	243,207	6.0	0.25	14.96	0.00	8.83	8.83	106.69	48,497	99%
116	2.8	242,515	5.9	0.25	14.63	0.00	8.81	8.81	106.65	48,475	99%
118	2.6	241,793	5.9	0.25	14.29	0.00	8.80	8.80	106.59	48,452	99%
120	2.3	241,044	5.9	0.25	13.95	0.00	8.79	8.79	106.54	48,428	99%
122	2.1	240,270	5.9	0.25	13.59	0.00	8.78	8.78	106.49	48,403	99%
124	2.0	239,474	5.9	0.25	13.23	0.00	8.76	8.76	106.43	48,378	99%
126	1.8	238,657	5.9	0.25	12.86	0.00	8.75	8.75	106.37	48,352	99%
128	1.6	237,822	5.9	0.25	12.48	0.00	8.74	8.74	106.31	48,325	99%
130	1.5	236,970	5.8	0.25	12.11	0.00	8.72	8.72	106.25	48,297	99%
132	1.4	236,104	5.8	0.25	11.73	0.00	8.71	8.71	106.19	48,269	99%
134	1.3	235,223	5.8	0.25	11.34	0.00	8.69	8.69	106.13	48,240	99%
136	1.1	234,331	5.8	0.25	10.96	0.00	8.68	8.68	106.06	48,211	99%
138	1.0	233,427	5.8	0.25	10.58	0.00	8.66	8.66	106.00	48,181	99%
140	1.0	232,513	5.7	0.25	10.19	0.00	8.64	8.64	105.93	48,151	99%
142	0.9	231,591	5.7	0.25	9.81	0.00	8.63	8.63	105.87	48,121	99%
144	0.8	230,661	5.7	0.25	9.43	0.00	8.61	8.61	105.80	48,090	99%
146	0.7	229,723	5.7	0.25	9.05	0.00	8.60	8.60	105.73	48,059	99%
148	0.7	228,780	5.7	0.25	8.67	0.00	8.58	8.58	105.66	48,028	99%
150	0.6	227,830	5.6	0.25	8.30	0.00	8.56	8.30	105.59	47,996	99%
152	0.6	226,908	5.6	0.25	7.94	0.00	8.55	7.94	105.52	47,965	99%
154	0.5	226,022	5.6	0.25	7.61	0.00	8.53	7.61	105.46	47,935	99%
156	0.5	225,171	5.6	0.25	7.28	0.00	8.52	7.28	105.39	47,906	100%
158	0.4	224,353	5.6	0.25	6.98	0.00	8.50	6.98	105.33	47,879	100%
160	0.4	223,567	5.6	0.25	6.69	0.00	8.49	6.69	105.27	47,852	100%
162	0.4	222,811	5.5	0.25	6.42	0.00	8.48	6.42	105.22	47,826	100%
164	0.3	222,083	5.5	0.25	6.16	0.00	8.46	6.16	105.16	47,801	100%
166	0.3	221,383	5.5	0.25	5.92	0.00	8.45	5.92	105.11	47,777	100%
168	0.3	220,709	5.5	0.25	5.68	0.00	8.44	5.68	105.06	47,754	100%
170	0.3	220,061	5.5	0.25	5.46	0.00	8.43	5.46	105.01	47,732	100%
172	0.2	219,435	5.5	0.25	5.25	0.00	8.42	5.25	104.96	47,710	100%
174	0.2	218,833	5.5	0.25	5.05	0.00	8.41	5.05	104.92	47,689	100%
176	0.2	218,252	5.4	0.25	4.86	0.00	8.40	4.86	104.87	47,669	100%
178	0.2	217,692	5.4	0.25	4.68	0.00	8.39	4.68	104.83	47,650	100%
180	0.2	217,152	5.4	0.25	4.50	0.00	8.38	4.50	104.79	47,631	100%
182	0.1	216,631	5.4	0.25	4.34	0.00	8.37	4.34	104.75	47,612	100%
184	0.1	216,128	5.4	0.25	4.18	0.00	8.36	4.18	104.71	47,595	100%
186	0.1	215,642	5.4	0.25	4.03	0.00	8.35	4.03	104.67	47,578	100%
188	0.1	215,173	5.4	0.25	3.89	0.00	8.34	3.89	104.63	47,561	100%
190	0.1	214,720	5.4	0.25	3.75	0.00	8.33	3.75	104.60	47,545	100%
192	0.1	214,281	5.4	0.25	3.62	0.00	8.32	3.62	104.57	47,530	100%
194	0.1	213,858	5.4	0.25	3.50	0.00	8.32	3.50	104.53	47,515	100%
196	0.1	213,448	5.3	0.25	3.38	0.00	8.31	3.38	104.50	47,501	100%
198	0.1	213,052	5.3	0.25	3.27	0.00	8.30	3.27	104.47	47,486	100%
200	0.1	212,668	5.3	0.25	3.16	0.00	8.30	3.16	104.44	47,473	100%
202	0.1	212,297	5.3	0.25	3.06	0.00	8.29	3.06	104.41	47,460	100%
204	0.1	211,938	5.3	0.25	2.96	0.00	8.28	2.96	104.38	47,447	100%
206	0.1	211,590	5.3	0.25	2.86	0.00	8.28	2.86	104.36	47,434	100%


Sediment Basin #6 Colon Mine Phase 1 Hydrograph
25-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #7	Sheet: 1	Of: 4

Objective Design the sediment basin to contain the 10-year storm and pass the 100-year storm without over topping the berm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. VA Erosion and Sediment Control Handbook
3. NOAA Atlas 14, Volume 2, Version 3

Given

Phase	1	2	2	2		
Storm Event (yrs) =	10	10	25	100		
Total Drainage Area A (ac) =	16.4	33.1	33.1	33.1		
Disturbed Area (ac) =	12.5	29.3	29.3	29.3		
Curve Number CN =	82	81	81	81	Hydrographs	
Rainfall Depth P (in) =	5.28	5.28	6.28	7.88	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	85.59	134.71	171.36	230.40	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	59,580	cf (based on largest Phase)
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	58,599	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
238	0	49,034	0	0	0
239	1	52,537	50,775	50,775	1,881
240	2	56,098	54,308	105,083	3,892
241	3	59,717	57,898	162,981	6,036
242	4	63,393	61,546	224,527	8,316
243	5	67,128	65,252	289,779	10,733
244	6	70,920	69,015	358,794	13,289

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 162,981 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 59,717 *Required Surface Area Achieved*

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #7	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	162,981		
Number of Skimmers	2		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	16,298	0.19	cfs
Selected Skimmer Size (inches) =	4		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	3.5		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	2	2	2
Storm Event (yrs) =	10	10	25	100
S =	2.20	2.35	2.35	2.35
Runoff Depth Q* (inches) =	3.33	3.23	4.14	5.63
Time to Peak T_p (min) =	27.78	34.59	34.80	35.20

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	162,981
Z_2 (ft) =	6	S_2 (cf) =	358,794

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.1 Ref 2, III-8

$K_S = S_2/Z_2^{\,b}$ = 46,662

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #7	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor = 3.281 ft/sec per m/sec

Gravitational Acceleration, g (m/s^2) = 9.81

Specific Gravity of soil (s_s) = 2.6

Kinematic Viscosity of water (v) = 1.14E-06 n^2 / sec @ 20° C — Ref 2, IV-11

Diameter of the Design Particle d_{15} = 40.00E-06 m

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / v] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 6.90

Set Top of Dam at (ft) = 7.50

See Hydrograph

Emergency Spillway

Q_E (cfs) = 100-Yr Storm

Q_E (cfs) = 21.1

Cross Section = Trapezoid

Channel Side Slope (z) = 5 (enter X for X:1)

n = 0.03 Grass Lined

Vp (ft/sec) = 5.0 Permissible Velocity for lining — Ref 2, II-7

Allowable Shear Stress (psf) = 2.0 Allowable Shear Stress for lining

Bottom Width, b (ft) = 20

Calculate Required Depth of Spillway:

Normal-Depth Procedure

$AR^{2/3}=Qn/1.49s^{0.5}$ Q=VA

$Z_{req}=Qn/1.49s^{0.5}$ Area (A)= bd+z(d^2)

$Z_{av}=AR^{2/3}$ R=Area/(b+2d((z^2)+1)^.5)

Avg Shear Stress(T) = K_b*d*s*unit weight of water

Channel Slope ft/ft	Depth, d (ft)	A (sf)	Z_{req}	R	Z_{avail}	V (ft/sec)	T (psf)
0.01	0.39	8.50	4.26	0.35	4.26	2.5	0.2
0.02	0.32	6.82	3.01	0.29	3.01	3.1	0.4

Construct the channel to be : 20 ft, Bottom Width (measured at top of lining)

0.6 ft, depth (measured at top of lining)

1% slope

Anti-Seep Collar:

Anti-Seep Collar Size = 2 * Barrel Dia

Anti-Seep Collar Size (ft) = 4

Use Anti-Seep Collar Size (ft) = 4 x 4

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: EAW	Date: 1/4/15
Subject:	Permit Application	Checked: PAW	Date: 1/4/15
Task:	Sediment Basin #7	Sheet: 4	Of: 4

Minimum Concrete Base for Riser:

Diameter of Riser (in) =	60	From Hydrograph
Avg Density of Concrete (lbs/cf) =	87.6	
Density of Water (lbs/cf) =	62.4	
Riser Displacement (cf) =	125.66	Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy =	27^{-1}	
Min Concrete Needed (cy) =	3.32	
Width & Length (ft) =	6	
Thickness (ft) =	2.5	

Anti-Vortex Device:

Diameter of Riser (in) =	60	From Hydrograph
Cylinder Diameter (in) =	90	Ref 3, III-104, Table 3.14-D
Cylinder Thickness (gage) =	14	
Cylinder Height (in) =	29	

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	12	6 * Barrel Diameter
Q_B (cfs) =	34.3	Peak Flow out of the barrel 25-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
34.3	11.23	0.88	14.4	0.69	11.23	2.4

Flow Depth = Tailwater, d (ft) = 0.88 0.5* Barrel Diameter (ft) = 1.00 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
2	6	10	12	0.7	Class B

Conclusion

The basin can contain the 10-yr storm and pass the 100-yr storm without overtopping the berm.

HDR Computation

Job No. 06985-10570-018

Project:	Charah Colon Mine	Computed: PAW	Date: 12/31/14
Subject:	Permit Application	Checked: EAW	Date: 1/2/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	60	
Circumference of Riser (in) =	188.5	
eight of Riser from bottom of barrel (in) =	77	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	2	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.38	0.38
0.39	0.00	0.00	0.00			0.38	0.38
0.44	0.00	0.00	0.00			0.38	0.38
0.49	0.00	0.00	0.00			0.38	0.38
0.54	0.00	0.00	0.00			0.38	0.38
0.59	0.00	0.00	0.00			0.38	0.38
0.64	0.00	0.00	0.00			0.38	0.38
0.69	0.00	0.00	0.00			0.38	0.38
0.74	0.00	0.00	0.00			0.38	0.38
0.79	0.00	0.00	0.00			0.38	0.38
0.84	0.00	0.00	0.00			0.38	0.38
0.89	0.00	0.00	0.00			0.38	0.38
0.94	0.00	0.00	0.00			0.38	0.38
0.99	0.00	0.00	0.00			0.38	0.38
1.04	0.00	0.00	0.00			0.38	0.38
1.09	0.00	0.00	0.00			0.38	0.38
1.14	0.00	0.00	0.00			0.38	0.38
1.19	0.00	0.00	0.00			0.38	0.38
1.24	0.00	0.00	0.00			0.38	0.38
1.29	0.00	0.00	0.00			0.38	0.38
1.34	0.00	0.00	0.00			0.38	0.38
1.39	0.00	0.00	0.00			0.38	0.38
1.44	0.00	0.00	0.00			0.38	0.38
1.49	0.00	0.00	0.00			0.38	0.38
1.54	0.00	0.00	0.00			0.38	0.38
1.59	0.00	0.00	0.00			0.38	0.38

1.64	0.00	0.00	0.00	0.38	0.38
1.69	0.00	0.00	0.00	0.38	0.38
1.74	0.00	0.00	0.00	0.38	0.38
1.79	0.00	0.00	0.00	0.38	0.38
1.84	0.00	0.00	0.00	0.38	0.38
1.89	0.00	0.00	0.00	0.38	0.38
1.94	0.00	0.00	0.00	0.38	0.38
1.99	0.00	0.00	0.00	0.38	0.38
2.04	0.00	0.00	0.00	0.38	0.38
2.09	0.00	0.00	0.00	0.38	0.38
2.14	0.00	0.00	0.00	0.38	0.38
2.19	0.00	0.00	0.00	0.38	0.38
2.24	0.00	0.00	0.00	0.38	0.38
2.29	0.00	0.00	0.00	0.38	0.38
2.34	0.00	0.00	0.00	0.38	0.38
2.39	0.00	0.00	0.00	0.38	0.38
2.44	0.00	0.00	0.00	0.38	0.38
2.49	0.00	0.00	0.00	0.38	0.38
2.54	0.00	0.00	0.00	0.38	0.38
2.59	0.00	0.00	0.00	0.38	0.38
2.64	0.00	0.00	0.00	0.38	0.38
2.69	0.00	0.00	0.00	0.38	0.38
2.74	0.00	0.00	0.00	0.38	0.38
2.79	0.00	0.00	0.00	0.38	0.38
2.84	0.00	0.00	0.00	0.38	0.38
2.89	0.00	0.00	0.00	0.38	0.38
2.94	0.00	0.00	0.00	0.38	0.38
2.99	0.00	0.00	0.00	0.38	0.38
3.04	0.00	0.00	0.00	0.38	0.38
3.09	0.00	0.00	0.00	0.38	0.38
3.14	0.00	0.00	0.00	0.38	0.38
3.19	0.00	0.00	0.00	0.38	0.38
3.24	0.00	0.00	0.00	0.38	0.38
3.29	0.00	0.00	0.00	0.38	0.38
3.34	0.00	0.00	0.00	0.38	0.38
3.39	0.00	0.00	0.00	0.38	0.38
3.44	0.00	0.00	0.00	0.38	0.38
3.49	0.00	0.00	0.00	0.38	0.38
3.54	0.00	0.00	0.00	0.38	0.38
3.59	0.00	0.00	0.00	0.38	0.38
3.64	0.00	0.00	0.00	0.38	0.38
3.69	0.00	0.00	0.00	0.38	0.38
3.74	0.00	0.00	0.00	0.38	0.38
3.79	0.00	0.00	0.00	0.38	0.38
3.84	0.00	0.00	0.00	0.38	0.38
3.89	0.00	0.00	0.00	0.38	0.38
3.94	0.00	0.00	0.00	0.38	0.38
3.99	0.00	0.00	0.00	0.38	0.38

Computed By: PAW Date: 12/31/14

Checked By: EAW Date: 1/2/15

Sheet: _1__of __2_

Qp = 85.59 cfs

Tp = 27.78 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 7 Colon

Phase 1

10 - year Storm Event

b = 1.1

K_s = 46,662

Number of Riser/Barrel Assemblies	2			
Diameter of Barrel =	24	(in)		
Height of Riser above barrel =	4.4	(ft)		
Height of Riser from bottom of barrel=	6.4	(ft) elevation	244.40	
Emergency Spillway =	6.9	(ft) elevation	244.90	
Total Height of Dam =	7.5	(ft) elevation	245.50	
Length of Emergency Spillway =	20	(ft)		
Diameter of Riser =	60	(in)		
Permanent Pond Stage =	0	(ft) elevation	238.0	

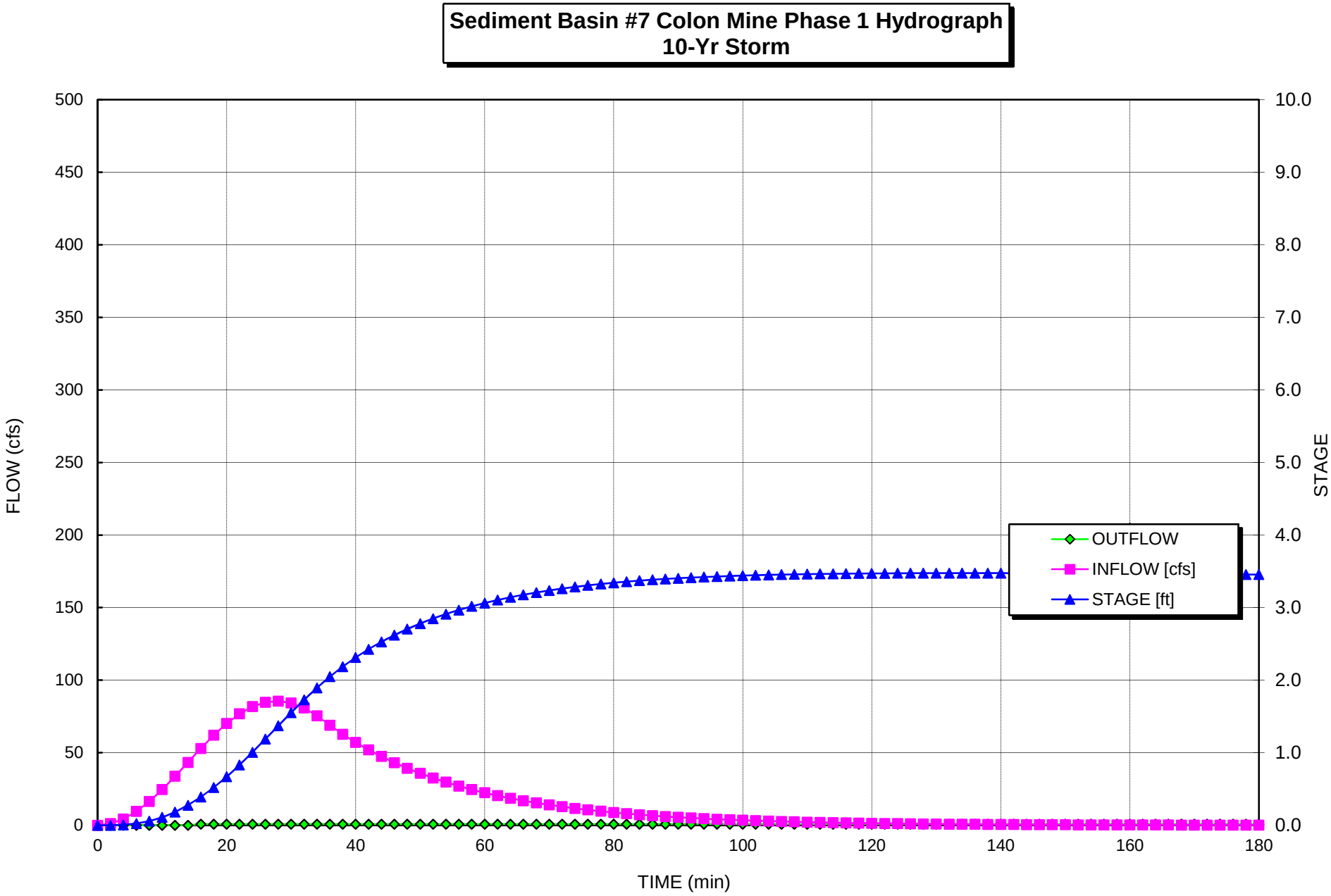
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
3.5	ft Maximum Stage	241.48	msl elevation
0.8	cfs Peak outflow		
0.8	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.1	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	4.3	131	0.0	0.00	0.00	0.00	0.00	0.00	57.19	25,995	N/A
6	9.5	647	0.0	0.00	0.00	0.00	0.00	0.00	69.47	31,575	N/A
8	16.4	1,785	0.1	0.00	0.00	0.00	0.00	0.00	78.58	35,720	N/A
10	24.6	3,748	0.1	0.00	0.00	0.00	0.00	0.00	86.00	39,091	N/A
12	33.7	6,696	0.2	0.00	0.00	0.00	0.00	0.00	92.29	41,951	N/A
14	43.3	10,743	0.3	0.00	0.00	0.00	0.00	0.00	97.75	44,433	N/A
16	52.9	15,943	0.4	0.38	0.38	0.00	0.38	0.75	102.56	46,618	100%
18	62.0	22,203	0.5	0.38	0.38	0.00	0.38	0.75	106.77	48,534	100%
20	70.1	29,550	0.7	0.38	0.38	0.00	0.38	0.75	110.55	50,251	100%
22	76.8	37,868	0.8	0.38	0.38	0.00	0.38	0.75	113.94	51,790	100%
24	81.7	46,991	1.0	0.38	0.38	0.00	0.38	0.75	116.97	53,167	100%
26	84.7	56,709	1.2	0.38	0.38	0.00	0.38	0.75	119.67	54,397	100%
28	85.6	66,786	1.4	0.38	0.38	0.00	0.38	0.75	122.08	55,490	100%
30	84.2	76,965	1.6	0.38	0.38	0.00	0.38	0.75	124.20	56,455	100%
32	80.8	86,984	1.7	0.38	0.38	0.00	0.38	0.75	126.06	57,302	100%
34	75.4	96,589	1.9	0.38	0.38	0.00	0.38	0.75	127.68	58,036	100%
36	68.9	105,550	2.0	0.38	0.38	0.00	0.38	0.75	129.06	58,666	100%
38	62.7	113,727	2.2	0.38	0.38	0.00	0.38	0.75	130.24	59,201	100%
40	57.1	121,166	2.3	0.38	0.38	0.00	0.38	0.75	131.25	59,658	100%
42	52.0	127,931	2.4	0.38	0.38	0.00	0.38	0.75	132.12	60,054	100%
44	47.4	134,084	2.5	0.38	0.38	0.00	0.38	0.75	132.88	60,398	100%
46	43.1	139,680	2.6	0.38	0.38	0.00	0.38	0.75	133.54	60,699	100%
48	39.3	144,767	2.7	0.38	0.38	0.00	0.38	0.75	134.12	60,964	100%
50	35.8	149,391	2.8	0.38	0.38	0.00	0.38	0.75	134.63	61,197	100%
52	32.6	153,595	2.8	0.38	0.38	0.00	0.38	0.75	135.09	61,404	100%
54	29.7	157,414	2.9	0.38	0.38	0.00	0.38	0.75	135.49	61,588	100%
56	27.0	160,884	3.0	0.38	0.38	0.00	0.38	0.75	135.85	61,751	100%
58	24.6	164,036	3.0	0.38	0.38	0.00	0.38	0.75	136.17	61,897	100%
60	22.4	166,899	3.1	0.38	0.38	0.00	0.38	0.75	136.46	62,028	100%
62	20.4	169,497	3.1	0.38	0.38	0.00	0.38	0.75	136.72	62,144	100%
64	18.6	171,855	3.1	0.38	0.38	0.00	0.38	0.75	136.95	62,249	100%
66	16.9	173,995	3.2	0.38	0.38	0.00	0.38	0.75	137.15	62,342	100%
68	15.4	175,935	3.2	0.38	0.38	0.00	0.38	0.75	137.34	62,427	100%
70	14.0	177,693	3.2	0.38	0.38	0.00	0.38	0.75	137.50	62,502	100%
72	12.8	179,287	3.3	0.38	0.38	0.00	0.38	0.75	137.65	62,570	100%
74	11.6	180,730	3.3	0.38	0.38	0.00	0.38	0.75	137.79	62,631	100%
76	10.6	182,036	3.3	0.38	0.38	0.00	0.38	0.75	137.91	62,686	100%
78	9.7	183,217	3.3	0.38	0.38	0.00	0.38	0.75	138.02	62,735	100%
80	8.8	184,285	3.3	0.38	0.38	0.00	0.38	0.75	138.12	62,780	100%
82	8.0	185,249	3.4	0.38	0.38	0.00	0.38	0.75	138.20	62,819	100%

84	7.3	186,118	3.4	0.38	0.38	0.00	0.38	0.75	138.28	62,855	100%
86	6.6	186,902	3.4	0.38	0.38	0.00	0.38	0.75	138.35	62,887	100%
88	6.0	187,608	3.4	0.38	0.38	0.00	0.38	0.75	138.42	62,916	100%
90	5.5	188,243	3.4	0.38	0.38	0.00	0.38	0.75	138.47	62,942	100%
92	5.0	188,813	3.4	0.38	0.38	0.00	0.38	0.75	138.52	62,965	100%
94	4.6	189,324	3.4	0.38	0.38	0.00	0.38	0.75	138.57	62,986	100%
96	4.2	189,781	3.4	0.38	0.38	0.00	0.38	0.75	138.61	63,004	100%
98	3.8	190,189	3.4	0.38	0.38	0.00	0.38	0.75	138.65	63,021	100%
100	3.4	190,553	3.4	0.38	0.38	0.00	0.38	0.75	138.68	63,035	100%
102	3.1	190,876	3.4	0.38	0.38	0.00	0.38	0.75	138.71	63,048	100%
104	2.9	191,162	3.5	0.38	0.38	0.00	0.38	0.75	138.73	63,060	100%
106	2.6	191,414	3.5	0.38	0.38	0.00	0.38	0.75	138.75	63,070	100%
108	2.4	191,636	3.5	0.38	0.38	0.00	0.38	0.75	138.77	63,079	100%
110	2.2	191,830	3.5	0.38	0.38	0.00	0.38	0.75	138.79	63,087	100%
112	2.0	191,999	3.5	0.38	0.38	0.00	0.38	0.75	138.81	63,093	100%
114	1.8	192,144	3.5	0.38	0.38	0.00	0.38	0.75	138.82	63,099	100%
116	1.6	192,268	3.5	0.38	0.38	0.00	0.38	0.75	138.83	63,104	100%
118	1.5	192,373	3.5	0.38	0.38	0.00	0.38	0.75	138.84	63,108	100%
120	1.4	192,461	3.5	0.38	0.38	0.00	0.38	0.75	138.85	63,112	100%
122	1.2	192,532	3.5	0.38	0.38	0.00	0.38	0.75	138.85	63,115	100%
124	1.1	192,590	3.5	0.38	0.38	0.00	0.38	0.75	138.86	63,117	100%
126	1.0	192,634	3.5	0.38	0.38	0.00	0.38	0.75	138.86	63,119	100%
128	0.9	192,666	3.5	0.38	0.38	0.00	0.38	0.75	138.86	63,120	100%
130	0.8	192,687	3.5	0.38	0.38	0.00	0.38	0.75	138.87	63,121	100%
132	0.8	192,698	3.5	0.38	0.38	0.00	0.38	0.75	138.87	63,121	100%
134	0.7	192,700	3.5	0.38	0.38	0.00	0.38	0.75	138.87	63,121	100%
136	0.6	192,693	3.5	0.38	0.38	0.00	0.38	0.75	138.87	63,121	100%
138	0.6	192,679	3.5	0.38	0.38	0.00	0.38	0.75	138.87	63,121	100%
140	0.5	192,659	3.5	0.38	0.38	0.00	0.38	0.75	138.86	63,120	100%
142	0.5	192,632	3.5	0.38	0.38	0.00	0.38	0.75	138.86	63,119	100%
144	0.4	192,599	3.5	0.38	0.38	0.00	0.38	0.75	138.86	63,117	100%
146	0.4	192,561	3.5	0.38	0.38	0.00	0.38	0.75	138.86	63,116	100%
148	0.4	192,519	3.5	0.38	0.38	0.00	0.38	0.75	138.85	63,114	100%
150	0.3	192,472	3.5	0.38	0.38	0.00	0.38	0.75	138.85	63,112	100%
152	0.3	192,421	3.5	0.38	0.38	0.00	0.38	0.75	138.84	63,110	100%
154	0.3	192,367	3.5	0.38	0.38	0.00	0.38	0.75	138.84	63,108	100%
156	0.3	192,310	3.5	0.38	0.38	0.00	0.38	0.75	138.83	63,106	100%
158	0.2	192,249	3.5	0.38	0.38	0.00	0.38	0.75	138.83	63,103	100%
160	0.2	192,186	3.5	0.38	0.38	0.00	0.38	0.75	138.82	63,101	100%
162	0.2	192,120	3.5	0.38	0.38	0.00	0.38	0.75	138.82	63,098	100%
164	0.2	192,053	3.5	0.38	0.38	0.00	0.38	0.75	138.81	63,096	100%
166	0.2	191,983	3.5	0.38	0.38	0.00	0.38	0.75	138.80	63,093	100%
168	0.1	191,911	3.5	0.38	0.38	0.00	0.38	0.75	138.80	63,090	100%
170	0.1	191,838	3.5	0.38	0.38	0.00	0.38	0.75	138.79	63,087	100%
172	0.1	191,763	3.5	0.38	0.38	0.00	0.38	0.75	138.78	63,084	100%
174	0.1	191,686	3.5	0.38	0.38	0.00	0.38	0.75	138.78	63,081	100%
176	0.1	191,609	3.5	0.38	0.38	0.00	0.38	0.75	138.77	63,078	100%
178	0.1	191,530	3.5	0.38	0.38	0.00	0.38	0.75	138.76	63,075	100%
180	0.1	191,450	3.5	0.38	0.38	0.00	0.38	0.75	138.76	63,072	100%
182	0.1	191,370	3.5	0.38	0.38	0.00	0.38	0.75	138.75	63,068	100%
184	0.1	191,288	3.5	0.38	0.38	0.00	0.38	0.75	138.74	63,065	100%
186	0.1	191,205	3.5	0.38	0.38	0.00	0.38	0.75	138.74	63,062	100%
188	0.1	191,122	3.5	0.38	0.38	0.00	0.38	0.75	138.73	63,058	100%
190	0.1	191,039	3.4	0.38	0.38	0.00	0.38	0.75	138.72	63,055	100%
192	0.0	190,954	3.4	0.38	0.38	0.00	0.38	0.75	138.71	63,052	100%
194	0.0	190,869	3.4	0.38	0.38	0.00	0.38	0.75	138.71	63,048	100%
196	0.0	190,784	3.4	0.38	0.38	0.00	0.38	0.75	138.70	63,045	100%
198	0.0	190,698	3.4	0.38	0.38	0.00	0.38	0.75	138.69	63,041	100%
200	0.0	190,611	3.4	0.38	0.38	0.00	0.38	0.75	138.68	63,038	100%
202	0.0	190,525	3.4	0.38	0.38	0.00	0.38	0.75	138.68	63,034	100%
204	0.0	190,438	3.4	0.38	0.38	0.00	0.38	0.75	138.67	63,031	100%
206	0.0	190,350	3.4	0.38	0.38	0.00	0.38	0.75	138.66	63,027	100%


Sediment Basin #7 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

Computed By: PAW Date: 12/31/14

Checked By: EAW Date: 1/2/15

Sheet: _1__of __2_

Sediment Basin # 7 Colon

Phase 2

10 - year Storm Event

Qp = 134.71 cfs

Tp = 34.59 minutes

dT = Max of **2** minutes

or **1.0%** of increment to peak

b = 1.1

Ks = 46,662

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	4.4	(ft)	
Height of Riser from bottom of barrel=	6.4	(ft) elevation	244.40
Emergency Spillway =	6.9	(ft) elevation	244.90
Total Height of Dam =	7.5	(ft) elevation	245.50
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	60	(in)	
Permanent Pond Stage =	0	(ft) elevation	238.0

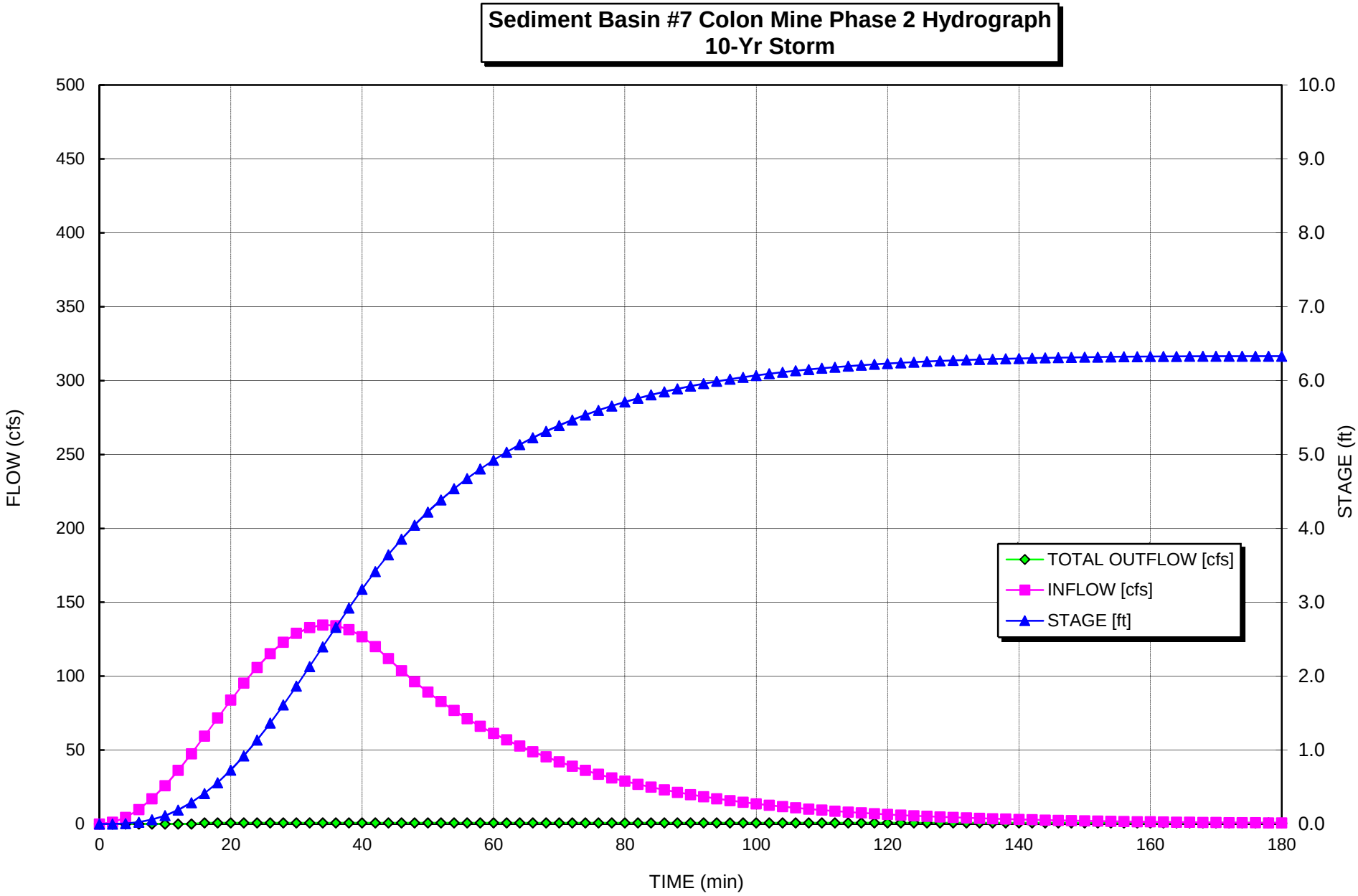
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
6.3	ft Maximum Stage	244.33	msl elevation
0.8	cfs Peak outflow		
0.8	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.1	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	4.4	133	0.0	0.00	0.00	0.00	0.00	0.00	57.30	26,047	N/A
6	9.8	661	0.0	0.00	0.00	0.00	0.00	0.00	69.64	31,653	N/A
8	17.0	1,832	0.1	0.00	0.00	0.00	0.00	0.00	78.83	35,832	N/A
10	25.9	3,873	0.1	0.00	0.00	0.00	0.00	0.00	86.35	39,249	N/A
12	36.2	6,984	0.2	0.00	0.00	0.00	0.00	0.00	92.77	42,166	N/A
14	47.5	11,329	0.3	0.00	0.00	0.00	0.00	0.00	98.39	44,721	N/A
16	59.5	17,029	0.4	0.38	0.38	0.00	0.38	0.75	103.39	46,993	100%
18	71.7	24,074	0.6	0.38	0.38	0.00	0.38	0.75	107.83	49,014	100%
20	83.7	32,584	0.7	0.38	0.38	0.00	0.38	0.75	111.87	50,852	100%
22	95.3	42,544	0.9	0.38	0.38	0.00	0.38	0.75	115.56	52,528	100%
24	105.9	53,887	1.1	0.38	0.38	0.00	0.38	0.75	118.93	54,060	100%
26	115.2	66,504	1.4	0.38	0.38	0.00	0.38	0.75	122.01	55,461	100%
28	123.0	80,242	1.6	0.38	0.38	0.00	0.38	0.75	124.83	56,742	100%
30	128.9	94,912	1.9	0.38	0.38	0.00	0.38	0.75	127.41	57,913	100%
32	132.9	110,296	2.1	0.38	0.38	0.00	0.38	0.75	129.76	58,980	100%
34	134.6	126,148	2.4	0.38	0.38	0.00	0.38	0.75	131.89	59,952	100%
36	134.2	142,211	2.7	0.38	0.38	0.00	0.38	0.75	133.83	60,832	100%
38	131.5	158,220	2.9	0.38	0.38	0.00	0.38	0.75	135.58	61,626	100%
40	126.7	173,909	3.2	0.38	0.38	0.00	0.38	0.75	137.15	62,339	100%
42	120.0	189,026	3.4	0.38	0.38	0.00	0.38	0.75	138.54	62,974	100%
44	111.9	203,337	3.6	0.38	0.38	0.00	0.38	0.75	139.78	63,535	100%
46	103.8	216,669	3.9	0.38	0.38	0.00	0.38	0.75	140.86	64,028	100%
48	96.2	229,028	4.0	0.38	0.38	0.00	0.38	0.75	141.81	64,461	100%
50	89.3	240,487	4.2	0.38	0.38	0.00	0.38	0.75	142.66	64,845	100%
52	82.8	251,109	4.4	0.38	0.38	0.00	0.38	0.75	143.41	65,187	100%
54	76.8	260,955	4.5	0.38	0.38	0.00	0.38	0.75	144.08	65,492	100%
56	71.2	270,081	4.7	0.38	0.38	0.00	0.38	0.75	144.69	65,767	100%
58	66.1	278,541	4.8	0.38	0.38	0.00	0.38	0.75	145.23	66,014	100%
60	61.3	286,381	4.9	0.38	0.38	0.00	0.38	0.75	145.72	66,237	100%
62	56.9	293,646	5.0	0.38	0.38	0.00	0.38	0.75	146.17	66,439	100%
64	52.7	300,379	5.1	0.38	0.38	0.00	0.38	0.75	146.57	66,623	100%
66	48.9	306,618	5.2	0.38	0.38	0.00	0.38	0.75	146.94	66,789	100%
68	45.4	312,399	5.3	0.38	0.38	0.00	0.38	0.75	147.27	66,941	100%
70	42.1	317,754	5.4	0.38	0.38	0.00	0.38	0.75	147.58	67,080	100%
72	39.0	322,715	5.5	0.38	0.38	0.00	0.38	0.75	147.85	67,206	100%
74	36.2	327,310	5.5	0.38	0.38	0.00	0.38	0.75	148.11	67,322	100%
76	33.6	331,566	5.6	0.38	0.38	0.00	0.38	0.75	148.34	67,428	100%
78	31.2	335,507	5.7	0.38	0.38	0.00	0.38	0.75	148.55	67,525	100%
80	28.9	339,156	5.7	0.38	0.38	0.00	0.38	0.75	148.75	67,614	100%
82	26.8	342,534	5.8	0.38	0.38	0.00	0.38	0.75	148.93	67,695	100%
84	24.9	345,661	5.8	0.38	0.38	0.00	0.38	0.75	149.09	67,770	100%

86	23.1	348,555	5.8	0.38	0.38	0.00	0.38	0.75	149.25	67,839	100%
88	21.4	351,233	5.9	0.38	0.38	0.00	0.38	0.75	149.38	67,902	100%
90	19.9	353,711	5.9	0.38	0.38	0.00	0.38	0.75	149.51	67,960	100%
92	18.4	356,002	6.0	0.38	0.38	0.00	0.38	0.75	149.63	68,014	100%
94	17.1	358,121	6.0	0.38	0.38	0.00	0.38	0.75	149.74	68,063	100%
96	15.8	360,080	6.0	0.38	0.38	0.00	0.38	0.75	149.84	68,108	100%
98	14.7	361,891	6.0	0.38	0.38	0.00	0.38	0.75	149.93	68,149	100%
100	13.6	363,563	6.1	0.38	0.38	0.00	0.38	0.75	150.01	68,188	100%
102	12.6	365,109	6.1	0.38	0.38	0.00	0.38	0.75	150.09	68,223	100%
104	11.7	366,535	6.1	0.38	0.38	0.00	0.38	0.75	150.16	68,255	100%
106	10.9	367,852	6.1	0.38	0.38	0.00	0.38	0.75	150.23	68,285	100%
108	10.1	369,067	6.2	0.38	0.38	0.00	0.38	0.75	150.29	68,312	100%
110	9.4	370,188	6.2	0.38	0.38	0.00	0.38	0.75	150.34	68,337	100%
112	8.7	371,220	6.2	0.38	0.38	0.00	0.38	0.75	150.39	68,361	100%
114	8.1	372,172	6.2	0.38	0.38	0.00	0.38	0.75	150.44	68,382	100%
116	7.5	373,048	6.2	0.38	0.38	0.00	0.38	0.75	150.48	68,401	100%
118	6.9	373,853	6.2	0.38	0.38	0.00	0.38	0.75	150.52	68,419	100%
120	6.4	374,594	6.2	0.38	0.38	0.00	0.38	0.75	150.56	68,436	100%
122	6.0	375,275	6.2	0.38	0.38	0.00	0.38	0.75	150.59	68,451	100%
124	5.5	375,900	6.3	0.38	0.38	0.00	0.38	0.75	150.62	68,465	100%
126	5.1	376,473	6.3	0.38	0.38	0.00	0.38	0.75	150.65	68,478	100%
128	4.8	376,998	6.3	0.38	0.38	0.00	0.38	0.75	150.68	68,489	100%
130	4.4	377,479	6.3	0.38	0.38	0.00	0.38	0.75	150.70	68,500	100%
132	4.1	377,918	6.3	0.38	0.38	0.00	0.38	0.75	150.72	68,509	100%
134	3.8	378,319	6.3	0.38	0.38	0.00	0.38	0.75	150.74	68,518	100%
136	3.5	378,684	6.3	0.38	0.38	0.00	0.38	0.75	150.76	68,526	100%
138	3.3	379,016	6.3	0.38	0.38	0.00	0.38	0.75	150.77	68,534	100%
140	3.0	379,318	6.3	0.38	0.38	0.00	0.38	0.75	150.79	68,540	100%
142	2.8	379,591	6.3	0.38	0.38	0.00	0.38	0.75	150.80	68,546	100%
144	2.6	379,838	6.3	0.38	0.38	0.00	0.38	0.75	150.81	68,552	100%
146	2.4	380,060	6.3	0.38	0.38	0.00	0.38	0.75	150.82	68,557	100%
148	2.2	380,260	6.3	0.38	0.38	0.00	0.38	0.75	150.83	68,561	100%
150	2.1	380,438	6.3	0.38	0.38	0.00	0.38	0.75	150.84	68,565	100%
152	1.9	380,598	6.3	0.38	0.38	0.00	0.38	0.75	150.85	68,568	100%
154	1.8	380,739	6.3	0.38	0.38	0.00	0.38	0.75	150.86	68,571	100%
156	1.7	380,863	6.3	0.38	0.38	0.00	0.38	0.75	150.86	68,574	100%
158	1.5	380,972	6.3	0.38	0.38	0.00	0.38	0.75	150.87	68,577	100%
160	1.4	381,066	6.3	0.38	0.38	0.00	0.38	0.75	150.87	68,579	100%
162	1.3	381,147	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,580	100%
164	1.2	381,216	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,582	100%
166	1.1	381,273	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,583	100%
168	1.1	381,319	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,584	100%
170	1.0	381,356	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,585	100%
172	0.9	381,383	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,586	100%
174	0.8	381,402	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,586	100%
176	0.8	381,412	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,586	100%
178	0.7	381,416	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,586	100%
180	0.7	381,412	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,586	100%
182	0.6	381,403	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,586	100%
184	0.6	381,387	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,586	100%
186	0.5	381,366	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,585	100%
188	0.5	381,340	6.3	0.38	0.38	0.00	0.38	0.75	150.89	68,585	100%
190	0.5	381,310	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,584	100%
192	0.4	381,275	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,583	100%
194	0.4	381,236	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,582	100%
196	0.4	381,193	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,581	100%
198	0.3	381,147	6.3	0.38	0.38	0.00	0.38	0.75	150.88	68,580	100%
200	0.3	381,097	6.3	0.38	0.38	0.00	0.38	0.75	150.87	68,579	100%
202	0.3	381,045	6.3	0.38	0.38	0.00	0.38	0.75	150.87	68,578	100%
204	0.3	380,990	6.3	0.38	0.38	0.00	0.38	0.75	150.87	68,577	100%


Sediment Basin #7 Colon Mine Phase 2 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE (ft)
TIME (min)
TOTAL OUTFLOW [cfs]
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Sediment Basin # 7 Colon

Phase 2

25 - year Storm Event

Qp =	171.36	cfs
Tp =	34.80	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.1

Ks = 46,662

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	4.4	(ft)	
Height of Riser from bottom of barrel=	6.4	(ft) elevation	244.40
Emergency Spillway =	6.9	(ft) elevation	244.90
Total Height of Dam =	7.5	(ft) elevation	245.50
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	60	(in)	
Permanent Pond Stage =	0	(ft) elevation	238.0

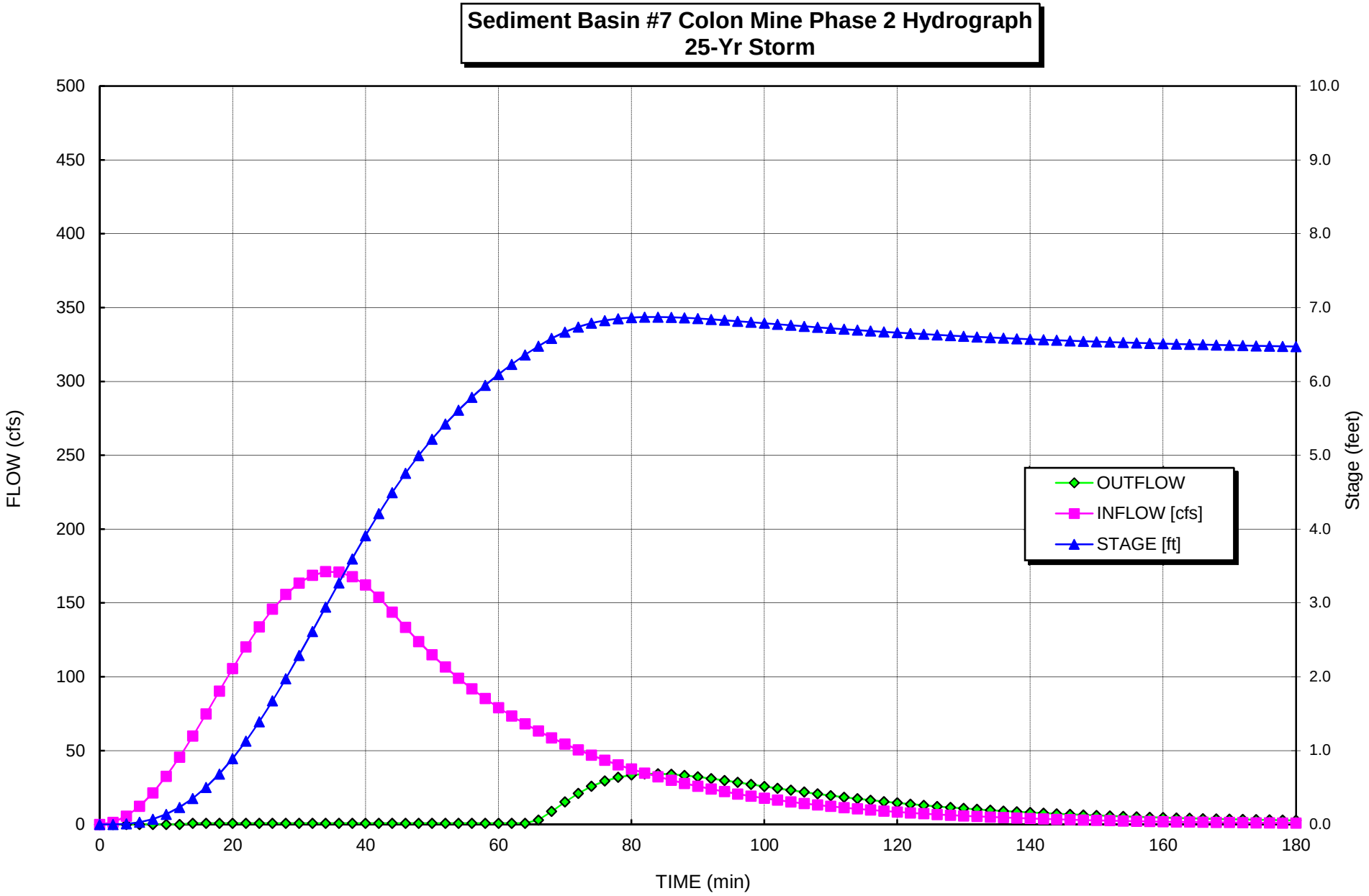
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
96%	Minimum Settling Efficiency		
6.9	ft Maximum Stage	244.9	msl elevation
34.3	cfs Peak outflow		
34.3	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.4	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	5.5	167	0.0	0.00	0.00	0.00	0.00	0.00	58.92	26,780	N/A
6	12.3	830	0.0	0.00	0.00	0.00	0.00	0.00	71.60	32,544	N/A
8	21.4	2,301	0.1	0.00	0.00	0.00	0.00	0.00	81.05	36,841	N/A
10	32.6	4,868	0.1	0.00	0.00	0.00	0.00	0.00	88.78	40,355	N/A
12	45.5	8,779	0.2	0.00	0.00	0.00	0.00	0.00	95.38	43,355	N/A
14	59.8	14,244	0.4	0.38	0.38	0.00	0.38	0.75	101.16	45,983	100%
16	74.9	21,327	0.5	0.38	0.38	0.00	0.38	0.75	106.25	48,297	100%
18	90.3	30,220	0.7	0.38	0.38	0.00	0.38	0.75	110.85	50,388	100%
20	105.6	40,965	0.9	0.38	0.38	0.00	0.38	0.75	115.03	52,287	100%
22	120.2	53,545	1.1	0.38	0.38	0.00	0.38	0.75	118.84	54,018	100%
24	133.7	67,882	1.4	0.38	0.38	0.00	0.38	0.75	122.32	55,600	100%
26	145.7	83,841	1.7	0.38	0.38	0.00	0.38	0.75	125.50	57,046	100%
28	155.7	101,234	2.0	0.38	0.38	0.00	0.38	0.75	128.41	58,369	100%
30	163.4	119,827	2.3	0.38	0.38	0.00	0.38	0.75	131.07	59,578	100%
32	168.6	139,348	2.6	0.38	0.38	0.00	0.38	0.75	133.50	60,681	100%
34	171.1	159,493	2.9	0.38	0.38	0.00	0.38	0.75	135.71	61,686	100%
36	170.9	179,939	3.3	0.38	0.38	0.00	0.38	0.75	137.71	62,598	100%
38	167.8	200,352	3.6	0.38	0.38	0.00	0.38	0.75	139.53	63,421	100%
40	162.1	220,399	3.9	0.38	0.38	0.00	0.38	0.75	141.15	64,161	100%
42	153.9	239,762	4.2	0.38	0.38	0.00	0.38	0.75	142.61	64,821	100%
44	143.8	258,141	4.5	0.38	0.38	0.00	0.38	0.75	143.89	65,406	100%
46	133.4	275,302	4.8	0.38	0.38	0.00	0.38	0.75	145.02	65,920	100%
48	123.8	291,222	5.0	0.38	0.38	0.00	0.38	0.75	146.02	66,372	100%
50	114.9	305,989	5.2	0.38	0.38	0.00	0.38	0.75	146.90	66,773	100%
52	106.6	319,686	5.4	0.38	0.38	0.00	0.38	0.75	147.68	67,129	100%
54	99.0	332,391	5.6	0.38	0.38	0.00	0.38	0.75	148.39	67,448	100%
56	91.8	344,175	5.8	0.38	0.38	0.00	0.38	0.75	149.02	67,735	100%
58	85.2	355,104	5.9	0.38	0.38	0.00	0.38	0.75	149.58	67,993	100%
60	79.1	365,240	6.1	0.38	0.38	0.00	0.38	0.75	150.10	68,226	100%
62	73.4	374,640	6.2	0.38	0.38	0.00	0.38	0.75	150.56	68,437	100%
64	68.1	383,357	6.4	0.38	0.38	0.00	0.38	0.75	150.98	68,629	100%
66	63.2	391,440	6.5	0.38	1.48	0.00	35.34	2.97	151.37	68,803	100%
68	58.7	398,668	6.6	0.38	4.40	0.00	35.68	8.80	151.70	68,956	100%
70	54.4	404,652	6.7	0.38	7.59	0.00	35.96	15.19	151.98	69,081	99%
72	50.5	409,362	6.7	0.38	10.51	0.00	36.17	21.01	152.19	69,179	98%
74	46.9	412,902	6.8	0.38	12.90	0.00	36.33	25.80	152.35	69,251	98%
76	43.5	415,432	6.8	0.38	14.71	0.00	36.45	29.42	152.47	69,303	97%
78	40.4	417,123	6.8	0.38	15.96	0.00	36.52	31.92	152.54	69,337	97%
80	37.5	418,137	6.9	0.38	16.73	0.00	36.57	33.46	152.59	69,357	96%
82	34.8	418,618	6.9	0.38	17.10	0.00	36.59	34.20	152.61	69,367	96%
84	32.3	418,687	6.9	0.38	17.15	0.00	36.60	34.30	152.61	69,368	96%

86	29.9	418,443	6.9	0.38	16.96	0.00	36.58	33.93	152.60	69,363	96%
88	27.8	417,965	6.9	0.38	16.60	0.00	36.56	33.20	152.58	69,354	96%
90	25.8	417,316	6.9	0.38	16.11	0.00	36.53	32.22	152.55	69,341	96%
92	23.9	416,545	6.8	0.38	15.53	0.00	36.50	31.06	152.52	69,325	97%
94	22.2	415,690	6.8	0.38	14.90	0.00	36.46	29.80	152.48	69,308	97%
96	20.6	414,780	6.8	0.38	14.23	0.00	36.42	28.47	152.44	69,289	97%
98	19.1	413,837	6.8	0.38	13.56	0.00	36.38	27.12	152.39	69,270	97%
100	17.8	412,878	6.8	0.38	12.88	0.00	36.33	25.77	152.35	69,251	98%
102	16.5	411,916	6.8	0.38	12.22	0.00	36.29	24.43	152.31	69,231	98%
104	15.3	410,961	6.8	0.38	11.57	0.00	36.25	23.13	152.27	69,211	98%
106	14.2	410,020	6.7	0.38	10.94	0.00	36.20	21.88	152.22	69,192	98%
108	13.2	409,097	6.7	0.38	10.33	0.00	36.16	20.67	152.18	69,173	98%
110	12.2	408,197	6.7	0.38	9.76	0.00	36.12	19.51	152.14	69,155	98%
112	11.3	407,322	6.7	0.38	9.20	0.00	36.08	18.41	152.10	69,137	99%
114	10.5	406,473	6.7	0.38	8.68	0.00	36.04	17.36	152.06	69,119	99%
116	9.8	405,652	6.7	0.38	8.18	0.00	36.00	16.37	152.02	69,102	99%
118	9.1	404,860	6.7	0.38	7.72	0.00	35.97	15.43	151.99	69,086	99%
120	8.4	404,096	6.7	0.38	7.27	0.00	35.93	14.54	151.95	69,070	99%
122	7.8	403,360	6.6	0.38	6.85	0.00	35.90	13.71	151.92	69,054	99%
124	7.2	402,652	6.6	0.38	6.46	0.00	35.87	12.92	151.89	69,040	99%
126	6.7	401,971	6.6	0.38	6.09	0.00	35.83	12.17	151.86	69,025	99%
128	6.2	401,317	6.6	0.38	5.74	0.00	35.80	11.47	151.83	69,012	99%
130	5.8	400,688	6.6	0.38	5.41	0.00	35.78	10.82	151.80	68,999	99%
132	5.4	400,085	6.6	0.38	5.10	0.00	35.75	10.20	151.77	68,986	100%
134	5.0	399,506	6.6	0.38	4.81	0.00	35.72	9.62	151.74	68,974	100%
136	4.6	398,950	6.6	0.38	4.54	0.00	35.69	9.07	151.72	68,962	100%
138	4.3	398,417	6.6	0.38	4.28	0.00	35.67	8.56	151.69	68,951	100%
140	4.0	397,905	6.6	0.38	4.04	0.00	35.65	8.08	151.67	68,940	100%
142	3.7	397,414	6.6	0.38	3.81	0.00	35.62	7.62	151.65	68,930	100%
144	3.4	396,943	6.6	0.38	3.60	0.00	35.60	7.20	151.62	68,920	100%
146	3.2	396,491	6.6	0.38	3.40	0.00	35.58	6.80	151.60	68,910	100%
148	3.0	396,058	6.5	0.38	3.21	0.00	35.56	6.42	151.58	68,901	100%
150	2.7	395,642	6.5	0.38	3.03	0.00	35.54	6.07	151.56	68,892	100%
152	2.5	395,243	6.5	0.38	2.87	0.00	35.52	5.74	151.54	68,884	100%
154	2.4	394,860	6.5	0.38	2.71	0.00	35.50	5.43	151.53	68,876	100%
156	2.2	394,492	6.5	0.38	2.57	0.00	35.49	5.13	151.51	68,868	100%
158	2.0	394,139	6.5	0.38	2.43	0.00	35.47	4.86	151.49	68,860	100%
160	1.9	393,800	6.5	0.38	2.30	0.00	35.46	4.60	151.48	68,853	100%
162	1.8	393,474	6.5	0.38	2.18	0.00	35.44	4.36	151.46	68,846	100%
164	1.6	393,161	6.5	0.38	2.07	0.00	35.43	4.13	151.45	68,840	100%
166	1.5	392,860	6.5	0.38	1.96	0.00	35.41	3.92	151.43	68,833	100%
168	1.4	392,572	6.5	0.38	1.86	0.00	35.40	3.71	151.42	68,827	100%
170	1.3	392,294	6.5	0.38	1.76	0.00	35.38	3.52	151.41	68,821	100%
172	1.2	392,027	6.5	0.38	1.67	0.00	35.37	3.35	151.39	68,816	100%
174	1.1	391,770	6.5	0.38	1.59	0.00	35.36	3.18	151.38	68,810	100%
176	1.0	391,523	6.5	0.38	1.51	0.00	35.35	3.02	151.37	68,805	100%
178	1.0	391,285	6.5	0.38	1.44	0.00	35.34	2.87	151.36	68,800	100%
180	0.9	391,056	6.5	0.38	1.37	0.00	35.33	2.73	151.35	68,795	100%
182	0.8	390,836	6.5	0.38	1.30	0.00	35.32	2.60	151.34	68,790	100%
184	0.8	390,623	6.5	0.38	1.24	0.00	35.31	2.48	151.33	68,785	100%
186	0.7	390,418	6.5	0.38	1.18	0.00	35.30	2.36	151.32	68,781	100%
188	0.7	390,221	6.5	0.38	1.12	0.00	35.29	2.25	151.31	68,777	100%
190	0.6	390,031	6.5	0.38	1.07	0.00	35.28	2.15	151.30	68,773	100%
192	0.6	389,847	6.5	0.38	1.02	0.00	35.27	2.05	151.29	68,769	100%
194	0.5	389,670	6.5	0.38	0.98	0.00	35.26	1.96	151.28	68,765	100%
196	0.5	389,498	6.4	0.38	0.94	0.00	35.25	1.87	151.28	68,761	100%
198	0.5	389,333	6.4	0.38	0.89	0.00	35.25	1.79	151.27	68,758	100%
200	0.4	389,173	6.4	0.38	0.86	0.00	35.24	1.71	151.26	68,754	100%
202	0.4	389,019	6.4	0.38	0.82	0.00	35.23	1.64	151.25	68,751	100%
204	0.4	388,869	6.4	0.38	0.79	0.00	35.22	1.57	151.25	68,748	100%
206	0.3	388,724	6.4	0.38	0.75	0.00	35.22	1.51	151.24	68,745	100%


Sediment Basin #7 Colon Mine Phase 2 Hydrograph
25-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

Sediment Basin # 7 Colon

Phase 2

100 - year Storm Event

Qp =	230.4	cfs
Tp =	35.2	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.1

Ks = 46,662

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	24	(in)	
Height of Riser above barrel =	4.4	(ft)	
Height of Riser from bottom of barrel=	6.4	(ft) elevation	244.40
Emergency Spillway =	6.9	(ft) elevation	244.90
Total Height of Dam =	7.5	(ft) elevation	245.50
Length of Emergency Spillway =	20	(ft)	
Diameter of Riser =	60	(in)	
Permanent Pond Stage =	0	(ft) elevation	238.0

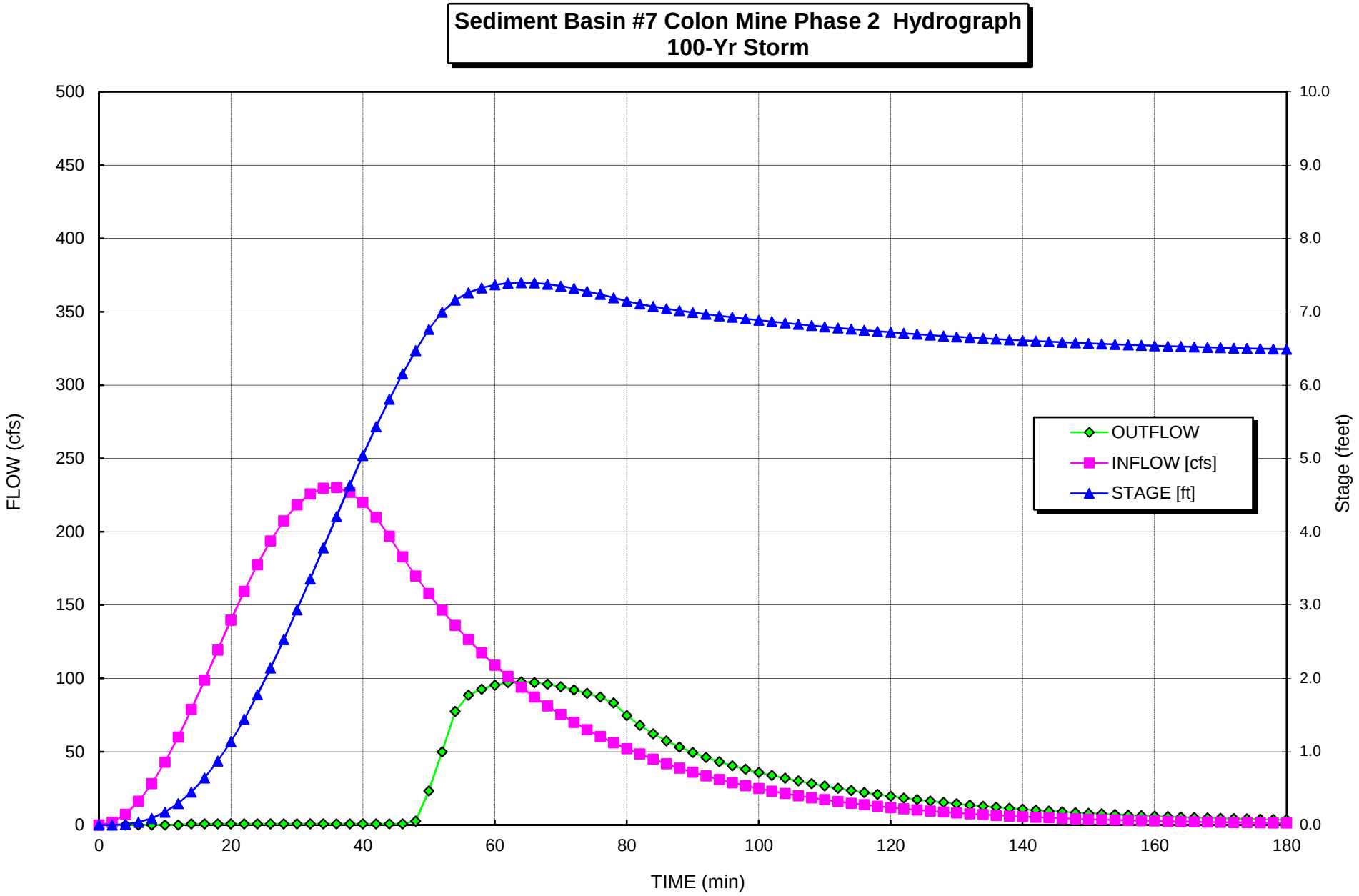
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
83%	Minimum Settling Efficiency		
7.4	ft Maximum Stage	245.4	msl elevation
97.5	cfs Peak outflow		
76.4	cfs Peak Riser/Barrel outflow		
21.1	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.8	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	7.3	220	0.0	0.00	0.00	0.00	0.00	0.00	60.91	27,686	N/A
6	16.1	1,091	0.0	0.00	0.00	0.00	0.00	0.00	74.02	33,645	N/A
8	28.1	3,027	0.1	0.00	0.00	0.00	0.00	0.00	83.80	38,089	N/A
10	42.9	6,403	0.2	0.00	0.00	0.00	0.00	0.00	91.79	41,723	N/A
12	60.0	11,554	0.3	0.00	0.00	0.00	0.00	0.00	98.62	44,828	N/A
14	78.8	18,753	0.4	0.38	0.38	0.00	0.38	0.75	104.60	47,547	100%
16	98.8	28,121	0.6	0.38	0.38	0.00	0.38	0.75	109.89	49,949	100%
18	119.3	39,888	0.9	0.38	0.38	0.00	0.38	0.75	114.66	52,118	100%
20	139.7	54,116	1.1	0.38	0.38	0.00	0.38	0.75	118.99	54,088	100%
22	159.3	70,788	1.4	0.38	0.38	0.00	0.38	0.75	122.94	55,884	100%
24	177.5	89,813	1.8	0.38	0.38	0.00	0.38	0.75	126.56	57,525	100%
26	193.7	111,021	2.1	0.38	0.38	0.00	0.38	0.75	129.86	59,027	100%
28	207.4	134,175	2.5	0.38	0.38	0.00	0.38	0.75	132.89	60,403	100%
30	218.2	158,976	2.9	0.38	0.38	0.00	0.38	0.75	135.66	61,662	100%
32	225.7	185,072	3.4	0.38	0.38	0.00	0.38	0.75	138.19	62,812	100%
34	229.7	212,070	3.8	0.38	0.38	0.00	0.38	0.75	140.49	63,861	100%
36	230.1	239,548	4.2	0.38	0.38	0.00	0.38	0.75	142.59	64,814	100%
38	226.8	267,070	4.6	0.38	0.38	0.00	0.38	0.75	144.49	65,677	100%
40	220.0	294,198	5.0	0.38	0.38	0.00	0.38	0.75	146.20	66,454	100%
42	209.8	320,505	5.4	0.38	0.38	0.00	0.38	0.75	147.73	67,150	100%
44	196.9	345,593	5.8	0.38	0.38	0.00	0.38	0.75	149.09	67,769	100%
46	182.9	369,129	6.2	0.38	0.38	0.00	0.38	0.75	150.29	68,314	100%
48	169.8	390,983	6.5	0.38	1.34	0.00	35.32	2.69	151.35	68,793	100%
50	157.8	411,042	6.8	0.38	11.62	0.00	36.25	23.24	152.27	69,213	98%
52	146.5	427,183	7.0	0.38	24.09	1.72	36.97	49.90	152.98	69,538	93%
54	136.1	438,778	7.2	0.38	34.73	7.96	37.48	77.42	153.48	69,765	87%
56	126.4	445,818	7.3	0.38	41.79	13.01	37.79	88.59	153.78	69,900	85%
58	117.4	450,355	7.3	0.38	46.55	16.67	37.99	92.64	153.97	69,986	84%
60	109.0	453,325	7.4	0.38	49.76	19.23	38.11	95.45	154.09	70,042	84%
62	101.3	454,956	7.4	0.38	51.56	20.68	38.18	97.04	154.16	70,073	83%
64	94.1	455,464	7.4	0.38	52.12	21.14	38.20	97.54	154.18	70,082	83%
66	87.4	455,047	7.4	0.38	51.66	20.76	38.19	97.13	154.16	70,074	83%
68	81.1	453,875	7.4	0.38	50.37	19.71	38.14	95.98	154.12	70,052	84%
70	75.4	452,095	7.4	0.38	48.43	18.15	38.06	94.27	154.04	70,019	84%
72	70.0	449,826	7.3	0.38	45.99	16.23	37.96	92.16	153.95	69,976	84%
74	65.0	447,168	7.3	0.38	43.19	14.07	37.85	89.77	153.84	69,926	85%
76	60.4	444,198	7.2	0.38	40.13	11.78	37.72	87.22	153.71	69,869	85%
78	56.1	440,978	7.2	0.38	36.89	9.45	37.58	83.23	153.58	69,807	86%
80	52.1	437,721	7.1	0.38	33.71	7.28	37.44	74.69	153.44	69,744	88%
82	48.4	435,009	7.1	0.38	31.13	5.61	37.32	67.88	153.32	69,692	89%
84	44.9	432,669	7.1	0.38	28.97	4.30	37.22	62.23	153.22	69,646	91%

86	41.7	430,594	7.0	0.38	27.09	3.23	37.13	57.41	153.13	69,605	92%
88	38.8	428,714	7.0	0.38	25.42	2.36	37.04	53.20	153.05	69,568	92%
90	36.0	426,982	7.0	0.38	23.92	1.64	36.97	49.47	152.97	69,534	93%
92	33.4	425,366	7.0	0.38	22.54	1.05	36.89	46.13	152.90	69,502	94%
94	31.1	423,843	6.9	0.38	21.27	0.58	36.83	43.12	152.84	69,472	94%
96	28.9	422,396	6.9	0.38	20.08	0.23	36.76	40.40	152.77	69,443	95%
98	26.8	421,010	6.9	0.38	18.97	0.02	36.70	37.96	152.71	69,415	95%
100	24.9	419,670	6.9	0.38	17.91	0.00	36.64	35.83	152.65	69,388	96%
102	23.1	418,357	6.9	0.38	16.90	0.00	36.58	33.80	152.60	69,362	96%
104	21.5	417,076	6.8	0.38	15.93	0.00	36.52	31.85	152.54	69,336	97%
106	19.9	415,829	6.8	0.38	15.00	0.00	36.47	30.00	152.48	69,311	97%
108	18.5	414,622	6.8	0.38	14.12	0.00	36.41	28.24	152.43	69,286	97%
110	17.2	413,456	6.8	0.38	13.29	0.00	36.36	26.58	152.38	69,262	97%
112	16.0	412,331	6.8	0.38	12.50	0.00	36.31	25.00	152.33	69,239	98%
114	14.8	411,247	6.8	0.38	11.76	0.00	36.26	23.52	152.28	69,217	98%
116	13.8	410,206	6.7	0.38	11.06	0.00	36.21	22.12	152.23	69,196	98%
118	12.8	409,205	6.7	0.38	10.40	0.00	36.17	20.81	152.19	69,175	98%
120	11.9	408,244	6.7	0.38	9.79	0.00	36.12	19.57	152.14	69,156	98%
122	11.0	407,322	6.7	0.38	9.21	0.00	36.08	18.41	152.10	69,137	99%
124	10.3	406,438	6.7	0.38	8.66	0.00	36.04	17.32	152.06	69,118	99%
126	9.5	405,591	6.7	0.38	8.15	0.00	36.00	16.30	152.02	69,101	99%
128	8.8	404,779	6.7	0.38	7.67	0.00	35.96	15.33	151.98	69,084	99%
130	8.2	404,000	6.7	0.38	7.22	0.00	35.93	14.43	151.95	69,068	99%
132	7.6	403,254	6.6	0.38	6.79	0.00	35.89	13.59	151.91	69,052	99%
134	7.1	402,540	6.6	0.38	6.40	0.00	35.86	12.79	151.88	69,037	99%
136	6.6	401,855	6.6	0.38	6.02	0.00	35.83	12.05	151.85	69,023	99%
138	6.1	401,200	6.6	0.38	5.68	0.00	35.80	11.35	151.82	69,009	99%
140	5.7	400,572	6.6	0.38	5.35	0.00	35.77	10.70	151.79	68,996	99%
142	5.3	399,970	6.6	0.38	5.04	0.00	35.74	10.08	151.76	68,984	100%
144	4.9	399,393	6.6	0.38	4.75	0.00	35.72	9.51	151.74	68,971	100%
146	4.6	398,841	6.6	0.38	4.48	0.00	35.69	8.96	151.71	68,960	100%
148	4.2	398,311	6.6	0.38	4.23	0.00	35.67	8.46	151.69	68,949	100%
150	3.9	397,803	6.6	0.38	3.99	0.00	35.64	7.98	151.66	68,938	100%
152	3.6	397,317	6.6	0.38	3.77	0.00	35.62	7.53	151.64	68,928	100%
154	3.4	396,851	6.6	0.38	3.56	0.00	35.60	7.11	151.62	68,918	100%
156	3.1	396,403	6.5	0.38	3.36	0.00	35.58	6.72	151.60	68,908	100%
158	2.9	395,974	6.5	0.38	3.18	0.00	35.56	6.35	151.58	68,899	100%
160	2.7	395,563	6.5	0.38	3.00	0.00	35.54	6.00	151.56	68,891	100%
162	2.5	395,168	6.5	0.38	2.84	0.00	35.52	5.68	151.54	68,882	100%
164	2.3	394,789	6.5	0.38	2.69	0.00	35.50	5.37	151.52	68,874	100%
166	2.2	394,426	6.5	0.38	2.54	0.00	35.48	5.08	151.51	68,867	100%
168	2.0	394,077	6.5	0.38	2.41	0.00	35.47	4.81	151.49	68,859	100%
170	1.9	393,742	6.5	0.38	2.28	0.00	35.45	4.56	151.47	68,852	100%
172	1.7	393,420	6.5	0.38	2.16	0.00	35.44	4.32	151.46	68,845	100%
174	1.6	393,111	6.5	0.38	2.05	0.00	35.42	4.09	151.44	68,839	100%
176	1.5	392,814	6.5	0.38	1.94	0.00	35.41	3.88	151.43	68,832	100%
178	1.4	392,528	6.5	0.38	1.84	0.00	35.40	3.68	151.42	68,826	100%
180	1.3	392,253	6.5	0.38	1.75	0.00	35.38	3.50	151.40	68,820	100%
182	1.2	391,989	6.5	0.38	1.66	0.00	35.37	3.32	151.39	68,815	100%
184	1.1	391,735	6.5	0.38	1.58	0.00	35.36	3.16	151.38	68,809	100%
186	1.0	391,491	6.5	0.38	1.50	0.00	35.35	3.00	151.37	68,804	100%
188	1.0	391,255	6.5	0.38	1.43	0.00	35.34	2.85	151.36	68,799	100%
190	0.9	391,029	6.5	0.38	1.36	0.00	35.33	2.72	151.35	68,794	100%
192	0.8	390,810	6.5	0.38	1.29	0.00	35.32	2.59	151.34	68,790	100%
194	0.8	390,600	6.5	0.38	1.23	0.00	35.31	2.46	151.33	68,785	100%
196	0.7	390,397	6.5	0.38	1.17	0.00	35.30	2.35	151.32	68,781	100%
198	0.7	390,202	6.5	0.38	1.12	0.00	35.29	2.24	151.31	68,776	100%
200	0.6	390,013	6.5	0.38	1.07	0.00	35.28	2.14	151.30	68,772	100%
202	0.6	389,831	6.5	0.38	1.02	0.00	35.27	2.04	151.29	68,769	100%
204	0.5	389,655	6.5	0.38	0.97	0.00	35.26	1.95	151.28	68,765	100%


Sediment Basin #7 Colon Mine Phase 2 Hydrograph
100-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #8	Sheet: 1	Of: 4

Objective Design the temporary sediment basin to contain the 25-year storm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. NOAA Atlas 14, Volume 2, Version 3
4. VA Erosion and Sediment Control Handbook

Given

Phase	1	1		
Storm Event (yrs) =	10	25		
Total Drainage Area A (ac) =	11.8	11.8		
Disturbed Area (ac) =	11.8	11.8		
Curve Number CN =	86	86	Hydrographs	
Rainfall Depth P (in) =	5.28	6.28	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	71.25	88.20	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	21,240	cf
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	38,367	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
273	0	5,639	-	-	-
274	1	18,291	11,362	11,362	421
275	2	28,277	23,103	34,465	1,276
276	3	38,333	33,178	67,643	2,505
277	4	47,710	42,936	110,579	4,096
278	5	59,010	53,260	163,839	6,068
279	6	69,292	64,082	227,922	8,442

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 67,643 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 38,333 *Increase Surface Area*

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #8	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	67,643		
Number of Skimmers	1		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	13,529	0.16	cfs
Selected Skimmer Size (inches) =	4		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	3.2		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	1
Storm Event (yrs) =	10	25
S =	1.63	1.63
Runoff Depth Q* (inches) =	3.73	4.68
Time to Peak T_p (min) =	26.88	27.23

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	67,643
Z_2 (ft) =	5	S_2 (cf) =	163,839

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.7 Ref 2, III-8

$K_S = S_2/Z_2^{\,b}$ = 10,091

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #8	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor =	3.281	ft/sec per m/sec		
Gravitational Acceleration, g (m/s^2) =	9.81			
Specific Gravity of soil (s_s) =	2.6			
Kinematic Viscosity of water (υ) =	1.14E-06	n^2 / sec @ 20° C		Ref 2, IV-11
Diameter of the Design Particle d_{15} =	40.00E-06	m		
Design Particle Settling Velocity =	$(g / 18) * [(s_s - 1) / \upsilon] d^2$ =		4.02E-03	ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 5.30
Set Top of Dam at (ft) = 6.00

See Hydrograph

Anti-Seep Collar:

Anti-Seep Collar Size =	2 * Barrel Dia	
Anti-Seep Collar Size (ft) =	2	
Use Anti-Seep Collar Size (ft) =	2	x 2

Minimum Concrete Base for Riser:

Diameter of Riser (in) =	18	From Hydrograph
Avg Density of Concrete (lbs/cf) =	87.6	
Density of Water (lbs/cf) =	62.4	
Riser Displacement (cf) =	7.95	Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy =	27^{-1}	
Min Concrete Needed (cy) =	0.21	
Width & Length (ft) =	2.5	
Thickness (ft) =	0.9	

Anti-Vortex Device:

Diameter of Riser (in) =	18	From Hydrograph
Cylinder Diameter (in) =	27	Ref 4, III-104, Table 3.14-D
Cylinder Thickness (gage) =	16	
Cylinder Height (in) =	8	

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #8	Sheet: 4	Of: 4

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	6	6 * Barrel Diameter
Q_B (cfs) =	2.6	Peak Flow out of the barrel 10-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
2.6	0.86	0.29	2.2	0.24	0.86	1.2

Flow Depth = Tailwater, d (ft) = 0.29 0.5* Barrel Diameter (ft) = 0.50 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
1	3	8	9	0.3	Class A

Conclusion

The temporary basin can contain the 25-yr storm.

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/4/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet: 1	Of: 2

Diameter of Riser (in) =	18	
Circumference of Riser (in) =	56.5	
Height of Riser from bottom of barrel (in) =	54	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	1	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.16	0.16
0.39	0.00	0.00	0.00			0.16	0.16
0.44	0.00	0.00	0.00			0.16	0.16
0.49	0.00	0.00	0.00			0.16	0.16
0.54	0.00	0.00	0.00			0.16	0.16
0.59	0.00	0.00	0.00			0.16	0.16
0.64	0.00	0.00	0.00			0.16	0.16
0.69	0.00	0.00	0.00			0.16	0.16
0.74	0.00	0.00	0.00			0.16	0.16
0.79	0.00	0.00	0.00			0.16	0.16
0.84	0.00	0.00	0.00			0.16	0.16
0.89	0.00	0.00	0.00			0.16	0.16
0.94	0.00	0.00	0.00			0.16	0.16
0.99	0.00	0.00	0.00			0.16	0.16
1.04	0.00	0.00	0.00			0.16	0.16
1.09	0.00	0.00	0.00			0.16	0.16
1.14	0.00	0.00	0.00			0.16	0.16
1.19	0.00	0.00	0.00			0.16	0.16
1.24	0.00	0.00	0.00			0.16	0.16
1.29	0.00	0.00	0.00			0.16	0.16
1.34	0.00	0.00	0.00			0.16	0.16
1.39	0.00	0.00	0.00			0.16	0.16
1.44	0.00	0.00	0.00			0.16	0.16
1.49	0.00	0.00	0.00			0.16	0.16
1.54	0.00	0.00	0.00			0.16	0.16
1.59	0.00	0.00	0.00			0.16	0.16

1.64	0.00	0.00	0.00	0.16	0.16
1.69	0.00	0.00	0.00	0.16	0.16
1.74	0.00	0.00	0.00	0.16	0.16
1.79	0.00	0.00	0.00	0.16	0.16
1.84	0.00	0.00	0.00	0.16	0.16
1.89	0.00	0.00	0.00	0.16	0.16
1.94	0.00	0.00	0.00	0.16	0.16
1.99	0.00	0.00	0.00	0.16	0.16
2.04	0.00	0.00	0.00	0.16	0.16
2.09	0.00	0.00	0.00	0.16	0.16
2.14	0.00	0.00	0.00	0.16	0.16
2.19	0.00	0.00	0.00	0.16	0.16
2.24	0.00	0.00	0.00	0.16	0.16
2.29	0.00	0.00	0.00	0.16	0.16
2.34	0.00	0.00	0.00	0.16	0.16
2.39	0.00	0.00	0.00	0.16	0.16
2.44	0.00	0.00	0.00	0.16	0.16
2.49	0.00	0.00	0.00	0.16	0.16
2.54	0.00	0.00	0.00	0.16	0.16
2.59	0.00	0.00	0.00	0.16	0.16
2.64	0.00	0.00	0.00	0.16	0.16
2.69	0.00	0.00	0.00	0.16	0.16
2.74	0.00	0.00	0.00	0.16	0.16
2.79	0.00	0.00	0.00	0.16	0.16
2.84	0.00	0.00	0.00	0.16	0.16
2.89	0.00	0.00	0.00	0.16	0.16
2.94	0.00	0.00	0.00	0.16	0.16
2.99	0.00	0.00	0.00	0.16	0.16
3.04	0.00	0.00	0.00	0.16	0.16
3.09	0.00	0.00	0.00	0.16	0.16
3.14	0.00	0.00	0.00	0.16	0.16
3.19	0.00	0.00	0.00	0.16	0.16
3.24	0.00	0.00	0.00	0.16	0.16
3.29	0.00	0.00	0.00	0.16	0.16
3.34	0.00	0.00	0.00	0.16	0.16
3.39	0.00	0.00	0.00	0.16	0.16
3.44	0.00	0.00	0.00	0.16	0.16
3.49	0.00	0.00	0.00	0.16	0.16
3.54	0.00	0.00	0.00	0.16	0.16
3.59	0.00	0.00	0.00	0.16	0.16
3.64	0.00	0.00	0.00	0.16	0.16
3.69	0.00	0.00	0.00	0.16	0.16
3.74	0.00	0.00	0.00	0.16	0.16
3.79	0.00	0.00	0.00	0.16	0.16
3.84	0.00	0.00	0.00	0.16	0.16
3.89	0.00	0.00	0.00	0.16	0.16
3.94	0.00	0.00	0.00	0.16	0.16
3.99	0.00	0.00	0.00	0.16	0.16

Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: _1__of _2__

Qp = 71.25 cfs

Tp = 26.88 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 8 Colon

Phase 1

10 - year Storm Event

b = 1.7

K_s = 10,091

Number of Riser/Barrel Assemblies	1			
Diameter of Barrel =	12	(in)		
Height of Riser above barrel =	3.5	(ft)		
Height of Riser from bottom of barrel=	4.5	(ft) elevation	277.50	
Emergency Spillway =	5.3	(ft) elevation	278.30	
Total Height of Dam =	6.0	(ft) elevation	279.00	
Length of Emergency Spillway =	10	(ft)		
Diameter of Riser =	18	(in)		
Permanent Pond Stage =	0	(ft) elevation	273.0	

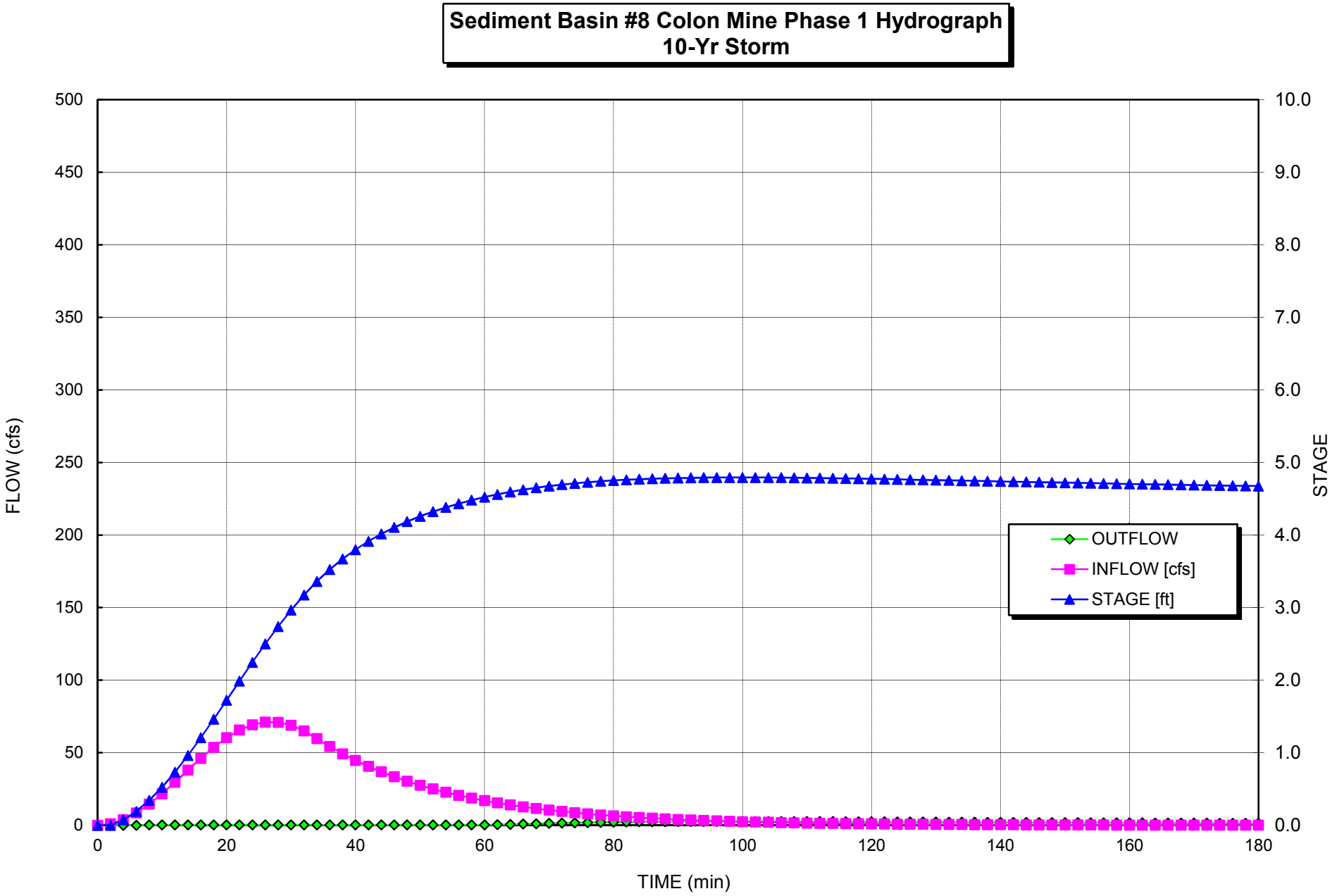
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
4.8	ft Maximum Stage	277.79	msl elevation
2.6	cfs Peak outflow		
2.6	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	3.8	116	0.1	0.00	0.00	0.00	0.00	0.00	5.83	2,650	N/A
6	8.4	575	0.2	0.00	0.00	0.00	0.00	0.00	11.46	5,208	N/A
8	14.5	1,584	0.3	0.16	0.16	0.00	0.16	0.16	17.58	7,991	100%
10	21.7	3,301	0.5	0.16	0.16	0.00	0.16	0.16	23.98	10,899	100%
12	29.7	5,884	0.7	0.16	0.16	0.00	0.16	0.16	30.61	13,914	100%
14	38.0	9,424	1.0	0.16	0.16	0.00	0.16	0.16	37.35	16,978	100%
16	46.1	13,960	1.2	0.16	0.16	0.00	0.16	0.16	44.10	20,045	100%
18	53.7	19,476	1.5	0.16	0.16	0.00	0.16	0.16	50.76	23,073	100%
20	60.3	25,904	1.7	0.16	0.16	0.00	0.16	0.16	57.26	26,028	100%
22	65.6	33,126	2.0	0.16	0.16	0.00	0.16	0.16	63.53	28,879	100%
24	69.2	40,980	2.2	0.16	0.16	0.00	0.16	0.16	69.51	31,595	100%
26	71.1	49,271	2.5	0.16	0.16	0.00	0.16	0.16	75.14	34,154	100%
28	70.9	57,780	2.7	0.16	0.16	0.00	0.16	0.16	80.37	36,532	100%
30	68.9	66,274	3.0	0.16	0.16	0.00	0.16	0.16	85.17	38,712	100%
32	65.1	74,525	3.2	0.16	0.16	0.00	0.16	0.16	89.50	40,680	100%
34	59.7	82,313	3.4	0.16	0.16	0.00	0.16	0.16	93.33	42,425	100%
36	54.2	89,462	3.5	0.16	0.16	0.00	0.16	0.16	96.68	43,944	100%
38	49.2	95,950	3.7	0.16	0.16	0.00	0.16	0.16	99.58	45,264	100%
40	44.7	101,837	3.8	0.16	0.16	0.00	0.16	0.16	102.12	46,417	100%
42	40.6	107,181	3.9	0.16	0.16	0.00	0.16	0.16	104.35	47,431	100%
44	36.8	112,029	4.0	0.16	0.16	0.00	0.16	0.16	106.32	48,326	100%
46	33.4	116,430	4.1	0.16	0.16	0.00	0.16	0.16	108.06	49,119	100%
48	30.3	120,422	4.2	0.16	0.16	0.00	0.16	0.16	109.61	49,824	100%
50	27.5	124,045	4.3	0.16	0.16	0.00	0.16	0.16	110.99	50,452	100%
52	25.0	127,333	4.3	0.16	0.16	0.00	0.16	0.16	112.23	51,013	100%
54	22.7	130,315	4.4	0.16	0.16	0.00	0.16	0.16	113.33	51,514	100%
56	20.6	133,021	4.4	0.16	0.16	0.00	0.16	0.16	114.32	51,964	100%
58	18.7	135,475	4.5	0.16	0.16	0.00	0.16	0.16	115.21	52,367	100%
60	17.0	137,702	4.5	0.16	0.21	0.00	7.57	0.21	116.00	52,729	100%
62	15.4	139,715	4.6	0.16	0.39	0.00	7.61	0.39	116.72	53,053	100%
64	14.0	141,519	4.6	0.16	0.61	0.00	7.64	0.61	117.35	53,341	100%
66	12.7	143,125	4.6	0.16	0.84	0.00	7.67	0.84	117.91	53,597	100%
68	11.5	144,549	4.7	0.16	1.07	0.00	7.69	1.07	118.41	53,821	100%
70	10.5	145,805	4.7	0.16	1.29	0.00	7.71	1.29	118.84	54,018	100%
72	9.5	146,907	4.7	0.16	1.49	0.00	7.73	1.49	119.22	54,190	100%
74	8.6	147,869	4.7	0.16	1.68	0.00	7.75	1.68	119.55	54,340	100%
76	7.8	148,703	4.7	0.16	1.85	0.00	7.76	1.85	119.83	54,469	100%
78	7.1	149,422	4.7	0.16	2.00	0.00	7.78	2.00	120.08	54,580	100%
80	6.5	150,036	4.8	0.16	2.13	0.00	7.79	2.13	120.29	54,675	100%
82	5.9	150,555	4.8	0.16	2.24	0.00	7.79	2.24	120.46	54,755	100%

84	5.3	150,990	4.8	0.16	2.33	0.00	7.80	2.33	120.61	54,822	100%
86	4.8	151,348	4.8	0.16	2.41	0.00	7.81	2.41	120.73	54,877	100%
88	4.4	151,638	4.8	0.16	2.48	0.00	7.81	2.48	120.83	54,921	100%
90	4.0	151,867	4.8	0.16	2.53	0.00	7.82	2.53	120.90	54,956	100%
92	3.6	152,041	4.8	0.16	2.57	0.00	7.82	2.57	120.96	54,983	100%
94	3.3	152,166	4.8	0.16	2.60	0.00	7.82	2.60	121.00	55,002	100%
96	3.0	152,248	4.8	0.16	2.62	0.00	7.82	2.62	121.03	55,014	100%
98	2.7	152,292	4.8	0.16	2.63	0.00	7.82	2.63	121.05	55,021	100%
100	2.5	152,301	4.8	0.16	2.63	0.00	7.82	2.63	121.05	55,022	100%
102	2.2	152,280	4.8	0.16	2.62	0.00	7.82	2.62	121.04	55,019	100%
104	2.0	152,232	4.8	0.16	2.61	0.00	7.82	2.61	121.03	55,012	100%
106	1.8	152,161	4.8	0.16	2.60	0.00	7.82	2.60	121.00	55,001	100%
108	1.7	152,070	4.8	0.16	2.58	0.00	7.82	2.58	120.97	54,987	100%
110	1.5	151,961	4.8	0.16	2.55	0.00	7.82	2.55	120.93	54,970	100%
112	1.4	151,836	4.8	0.16	2.52	0.00	7.82	2.52	120.89	54,951	100%
114	1.2	151,698	4.8	0.16	2.49	0.00	7.81	2.49	120.85	54,930	100%
116	1.1	151,549	4.8	0.16	2.46	0.00	7.81	2.46	120.80	54,907	100%
118	1.0	151,389	4.8	0.16	2.42	0.00	7.81	2.42	120.74	54,883	100%
120	0.9	151,222	4.8	0.16	2.39	0.00	7.81	2.39	120.69	54,857	100%
122	0.8	151,048	4.8	0.16	2.35	0.00	7.80	2.35	120.63	54,831	100%
124	0.8	150,868	4.8	0.16	2.31	0.00	7.80	2.31	120.57	54,803	100%
126	0.7	150,683	4.8	0.16	2.27	0.00	7.80	2.27	120.50	54,775	100%
128	0.6	150,495	4.8	0.16	2.23	0.00	7.79	2.23	120.44	54,746	100%
130	0.6	150,304	4.8	0.16	2.18	0.00	7.79	2.18	120.38	54,716	100%
132	0.5	150,111	4.8	0.16	2.14	0.00	7.79	2.14	120.31	54,687	100%
134	0.5	149,916	4.8	0.16	2.10	0.00	7.78	2.10	120.24	54,657	100%
136	0.4	149,721	4.7	0.16	2.06	0.00	7.78	2.06	120.18	54,627	100%
138	0.4	149,525	4.7	0.16	2.02	0.00	7.78	2.02	120.11	54,596	100%
140	0.4	149,330	4.7	0.16	1.98	0.00	7.77	1.98	120.05	54,566	100%
142	0.3	149,135	4.7	0.16	1.94	0.00	7.77	1.94	119.98	54,536	100%
144	0.3	148,942	4.7	0.16	1.90	0.00	7.77	1.90	119.91	54,506	100%
146	0.3	148,749	4.7	0.16	1.86	0.00	7.76	1.86	119.85	54,477	100%
148	0.2	148,558	4.7	0.16	1.82	0.00	7.76	1.82	119.78	54,447	100%
150	0.2	148,369	4.7	0.16	1.78	0.00	7.76	1.78	119.72	54,418	100%
152	0.2	148,182	4.7	0.16	1.74	0.00	7.75	1.74	119.65	54,389	100%
154	0.2	147,996	4.7	0.16	1.71	0.00	7.75	1.71	119.59	54,360	100%
156	0.2	147,813	4.7	0.16	1.67	0.00	7.75	1.67	119.53	54,331	100%
158	0.1	147,633	4.7	0.16	1.63	0.00	7.75	1.63	119.47	54,303	100%
160	0.1	147,455	4.7	0.16	1.60	0.00	7.74	1.60	119.41	54,276	100%
162	0.1	147,279	4.7	0.16	1.56	0.00	7.74	1.56	119.35	54,248	100%
164	0.1	147,106	4.7	0.16	1.53	0.00	7.74	1.53	119.29	54,221	100%
166	0.1	146,935	4.7	0.16	1.50	0.00	7.73	1.50	119.23	54,195	100%
168	0.1	146,768	4.7	0.16	1.47	0.00	7.73	1.47	119.17	54,169	100%
170	0.1	146,603	4.7	0.16	1.44	0.00	7.73	1.44	119.11	54,143	100%
172	0.1	146,440	4.7	0.16	1.41	0.00	7.73	1.41	119.06	54,118	100%
174	0.1	146,281	4.7	0.16	1.38	0.00	7.72	1.38	119.00	54,093	100%
176	0.1	146,124	4.7	0.16	1.35	0.00	7.72	1.35	118.95	54,068	100%
178	0.1	145,970	4.7	0.16	1.32	0.00	7.72	1.32	118.90	54,044	100%
180	0.1	145,818	4.7	0.16	1.29	0.00	7.71	1.29	118.84	54,020	100%
182	0.0	145,669	4.7	0.16	1.26	0.00	7.71	1.26	118.79	53,997	100%
184	0.0	145,523	4.7	0.16	1.24	0.00	7.71	1.24	118.74	53,974	100%
186	0.0	145,380	4.7	0.16	1.21	0.00	7.71	1.21	118.69	53,952	100%
188	0.0	145,239	4.7	0.16	1.19	0.00	7.70	1.19	118.64	53,930	100%
190	0.0	145,100	4.7	0.16	1.16	0.00	7.70	1.16	118.60	53,908	100%
192	0.0	144,964	4.7	0.16	1.14	0.00	7.70	1.14	118.55	53,886	100%
194	0.0	144,831	4.7	0.16	1.12	0.00	7.70	1.12	118.50	53,865	100%
196	0.0	144,700	4.7	0.16	1.10	0.00	7.70	1.10	118.46	53,845	100%
198	0.0	144,571	4.7	0.16	1.07	0.00	7.69	1.07	118.41	53,825	100%
200	0.0	144,445	4.6	0.16	1.05	0.00	7.69	1.05	118.37	53,805	100%
202	0.0	144,321	4.6	0.16	1.03	0.00	7.69	1.03	118.33	53,785	100%
204	0.0	144,199	4.6	0.16	1.01	0.00	7.69	1.01	118.29	53,766	100%
206	0.0	144,080	4.6	0.16	0.99	0.00	7.68	0.99	118.24	53,747	100%


Sediment Basin #8 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

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Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: _1__of _2__

Qp = 88.20 cfs

Tp = 27.23 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 8 Colon

Phase 1

25 - year Storm Event

b = 1.7

K_s = 10,091

Number of Riser/Barrel Assemblies	1		
Diameter of Barrel =	12	(in)	
Height of Riser above barrel =	3.5	(ft)	
Height of Riser from bottom of barrel=	4.5	(ft) elevation	277.50
Emergency Spillway =	5.3	(ft) elevation	278.30
Total Height of Dam =	6.0	(ft) elevation	279.00
Length of Emergency Spillway =	10	(ft)	
Diameter of Riser =	18	(in)	
Permanent Pond Stage =	0	(ft) elevation	273.0

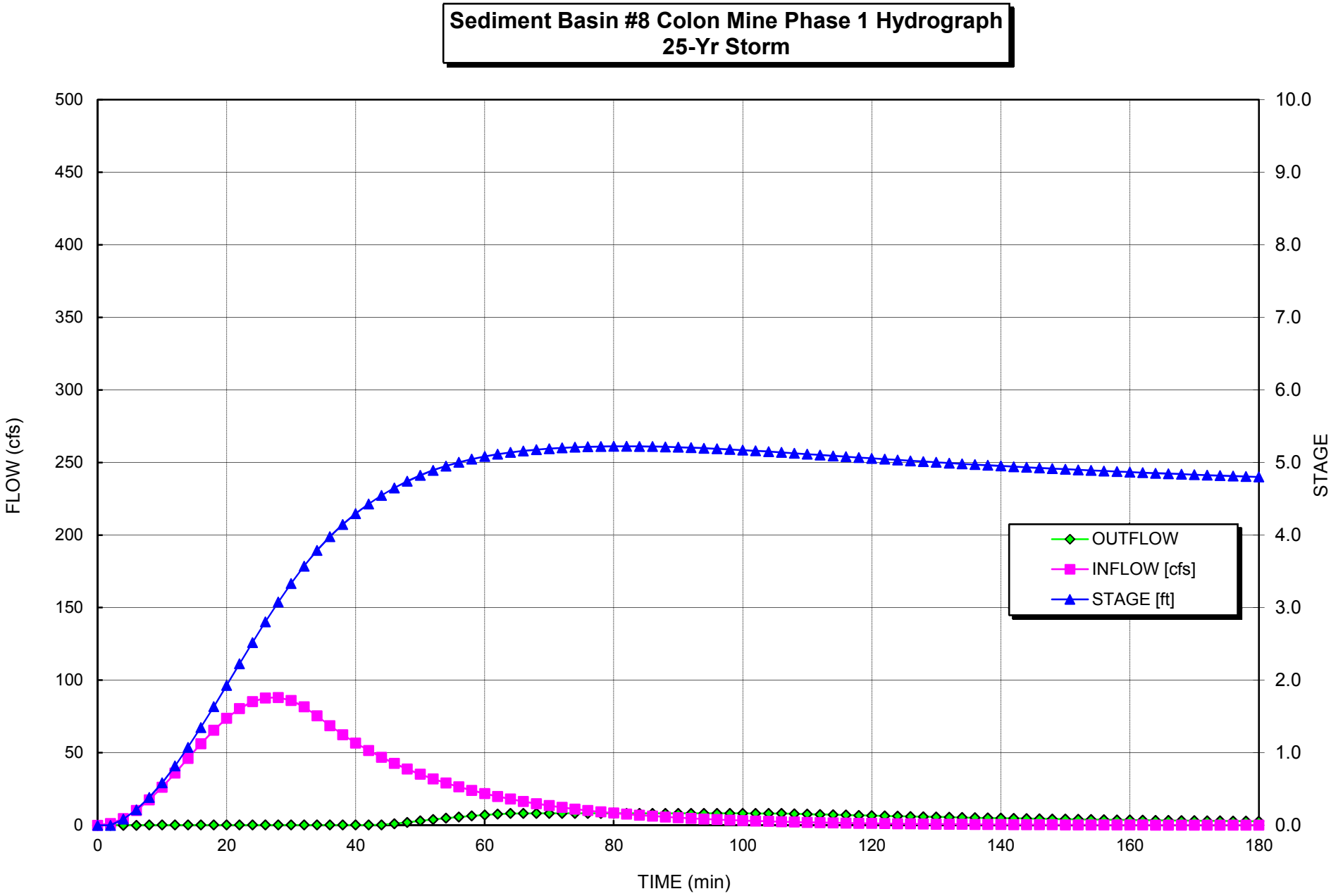
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.2	ft Maximum Stage	278.22	msl elevation
8.2	cfs Peak outflow		
8.2	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.2	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	4.6	140	0.1	0.00	0.00	0.00	0.00	0.00	6.31	2,869	N/A
6	10.2	694	0.2	0.00	0.00	0.00	0.00	0.00	12.40	5,638	N/A
8	17.5	1,912	0.4	0.16	0.16	0.00	0.16	0.16	19.04	8,653	100%
10	26.2	3,992	0.6	0.16	0.16	0.00	0.16	0.16	25.98	11,810	100%
12	35.9	7,122	0.8	0.16	0.16	0.00	0.16	0.16	33.18	15,083	100%
14	46.1	11,415	1.1	0.16	0.16	0.00	0.16	0.16	40.50	18,410	100%
16	56.1	16,923	1.3	0.16	0.16	0.00	0.16	0.16	47.84	21,743	100%
18	65.5	23,635	1.6	0.16	0.16	0.00	0.16	0.16	55.09	25,039	100%
20	73.7	31,473	1.9	0.16	0.16	0.00	0.16	0.16	62.17	28,261	100%
22	80.4	40,302	2.2	0.16	0.16	0.00	0.16	0.16	69.02	31,373	100%
24	85.2	49,933	2.5	0.16	0.16	0.00	0.16	0.16	75.56	34,347	100%
26	87.8	60,135	2.8	0.16	0.16	0.00	0.16	0.16	81.74	37,154	100%
28	88.0	70,647	3.1	0.16	0.16	0.00	0.16	0.16	87.50	39,771	100%
30	86.0	81,191	3.3	0.16	0.16	0.00	0.16	0.16	92.79	42,179	100%
32	81.7	91,488	3.6	0.16	0.16	0.00	0.16	0.16	97.60	44,362	100%
34	75.4	101,272	3.8	0.16	0.16	0.00	0.16	0.16	101.88	46,308	100%
36	68.6	110,303	4.0	0.16	0.16	0.00	0.16	0.16	105.62	48,010	100%
38	62.4	118,519	4.1	0.16	0.16	0.00	0.16	0.16	108.88	49,490	100%
40	56.7	125,986	4.3	0.16	0.16	0.00	0.16	0.16	111.73	50,784	100%
42	51.5	132,771	4.4	0.16	0.16	0.00	0.16	0.16	114.23	51,923	100%
44	46.8	138,937	4.5	0.16	0.31	0.00	7.59	0.31	116.44	52,928	100%
46	42.6	144,520	4.7	0.16	1.07	0.00	7.69	1.07	118.40	53,817	100%
48	38.7	149,502	4.7	0.16	2.01	0.00	7.78	2.01	120.10	54,593	100%
50	35.2	153,904	4.8	0.16	3.01	0.00	7.85	3.01	121.59	55,266	100%
52	32.0	157,764	4.9	0.16	3.97	0.00	7.91	3.97	122.87	55,848	100%
54	29.1	161,124	5.0	0.16	4.88	0.00	7.97	4.88	123.96	56,347	100%
56	26.4	164,025	5.0	0.16	5.71	0.00	8.01	5.71	124.90	56,774	100%
58	24.0	166,509	5.0	0.16	6.45	0.00	8.05	6.45	125.70	57,136	100%
60	21.8	168,617	5.1	0.16	7.09	0.00	8.08	7.09	126.37	57,440	100%
62	19.8	170,384	5.1	0.16	7.65	0.00	8.11	7.65	126.93	57,694	100%
64	18.0	171,847	5.1	0.16	8.11	0.00	8.13	8.11	127.39	57,903	100%
66	16.4	173,037	5.2	0.16	8.50	0.00	8.15	8.15	127.76	58,072	100%
68	14.9	174,025	5.2	0.16	8.82	0.00	8.17	8.17	128.07	58,212	100%
70	13.5	174,832	5.2	0.16	9.09	0.00	8.18	8.18	128.32	58,326	100%
72	12.3	175,476	5.2	0.16	9.30	0.00	8.19	8.19	128.52	58,416	100%
74	11.2	175,970	5.2	0.16	9.47	0.00	8.19	8.19	128.67	58,486	100%
76	10.2	176,328	5.2	0.16	9.59	0.00	8.20	8.20	128.78	58,536	100%
78	9.2	176,564	5.2	0.16	9.67	0.00	8.20	8.20	128.85	58,569	100%
80	8.4	176,688	5.2	0.16	9.71	0.00	8.21	8.21	128.89	58,586	100%
82	7.6	176,712	5.2	0.16	9.72	0.00	8.21	8.21	128.90	58,590	100%

84	6.9	176,643	5.2	0.16	9.70	0.00	8.20	8.20	128.88	58,580	100%
86	6.3	176,491	5.2	0.16	9.65	0.00	8.20	8.20	128.83	58,559	100%
88	5.7	176,263	5.2	0.16	9.57	0.00	8.20	8.20	128.76	58,527	100%
90	5.2	175,967	5.2	0.16	9.47	0.00	8.19	8.19	128.67	58,485	100%
92	4.7	175,609	5.2	0.16	9.35	0.00	8.19	8.19	128.56	58,435	100%
94	4.3	175,195	5.2	0.16	9.21	0.00	8.18	8.18	128.43	58,377	100%
96	3.9	174,729	5.2	0.16	9.06	0.00	8.18	8.18	128.28	58,311	100%
98	3.6	174,218	5.2	0.16	8.89	0.00	8.17	8.17	128.13	58,239	100%
100	3.2	173,664	5.2	0.16	8.70	0.00	8.16	8.16	127.95	58,161	100%
102	2.9	173,073	5.2	0.16	8.51	0.00	8.15	8.15	127.77	58,077	100%
104	2.7	172,447	5.2	0.16	8.31	0.00	8.14	8.14	127.57	57,988	100%
106	2.4	171,791	5.1	0.16	8.09	0.00	8.13	8.09	127.37	57,895	100%
108	2.2	171,110	5.1	0.16	7.88	0.00	8.12	7.88	127.15	57,798	100%
110	2.0	170,430	5.1	0.16	7.66	0.00	8.11	7.66	126.94	57,700	100%
112	1.8	169,751	5.1	0.16	7.45	0.00	8.10	7.45	126.73	57,603	100%
114	1.7	169,077	5.1	0.16	7.23	0.00	8.09	7.23	126.51	57,506	100%
116	1.5	168,407	5.1	0.16	7.03	0.00	8.08	7.03	126.30	57,410	100%
118	1.4	167,745	5.1	0.16	6.82	0.00	8.07	6.82	126.09	57,315	100%
120	1.2	167,090	5.1	0.16	6.62	0.00	8.06	6.62	125.88	57,220	100%
122	1.1	166,445	5.0	0.16	6.43	0.00	8.05	6.43	125.68	57,126	100%
124	1.0	165,810	5.0	0.16	6.24	0.00	8.04	6.24	125.48	57,034	100%
126	0.9	165,185	5.0	0.16	6.05	0.00	8.03	6.05	125.28	56,943	100%
128	0.8	164,571	5.0	0.16	5.87	0.00	8.02	5.87	125.08	56,854	100%
130	0.8	163,968	5.0	0.16	5.69	0.00	8.01	5.69	124.88	56,766	100%
132	0.7	163,378	5.0	0.16	5.52	0.00	8.00	5.52	124.69	56,679	100%
134	0.6	162,800	5.0	0.16	5.35	0.00	7.99	5.35	124.51	56,594	100%
136	0.6	162,234	5.0	0.16	5.19	0.00	7.98	5.19	124.32	56,511	100%
138	0.5	161,680	5.0	0.16	5.04	0.00	7.98	5.04	124.15	56,430	100%
140	0.5	161,139	5.0	0.16	4.89	0.00	7.97	4.89	123.97	56,350	100%
142	0.4	160,610	4.9	0.16	4.74	0.00	7.96	4.74	123.80	56,271	100%
144	0.4	160,093	4.9	0.16	4.60	0.00	7.95	4.60	123.63	56,195	100%
146	0.4	159,589	4.9	0.16	4.46	0.00	7.94	4.46	123.46	56,120	100%
148	0.3	159,097	4.9	0.16	4.33	0.00	7.93	4.33	123.30	56,047	100%
150	0.3	158,617	4.9	0.16	4.20	0.00	7.93	4.20	123.15	55,975	100%
152	0.3	158,148	4.9	0.16	4.08	0.00	7.92	4.08	122.99	55,905	100%
154	0.2	157,692	4.9	0.16	3.96	0.00	7.91	3.96	122.84	55,837	100%
156	0.2	157,247	4.9	0.16	3.84	0.00	7.90	3.84	122.70	55,770	100%
158	0.2	156,813	4.9	0.16	3.73	0.00	7.90	3.73	122.55	55,705	100%
160	0.2	156,389	4.9	0.16	3.62	0.00	7.89	3.62	122.41	55,642	100%
162	0.2	155,977	4.9	0.16	3.52	0.00	7.88	3.52	122.28	55,580	100%
164	0.2	155,575	4.9	0.16	3.42	0.00	7.88	3.42	122.14	55,519	100%
166	0.1	155,184	4.8	0.16	3.32	0.00	7.87	3.32	122.01	55,460	100%
168	0.1	154,802	4.8	0.16	3.22	0.00	7.86	3.22	121.89	55,403	100%
170	0.1	154,431	4.8	0.16	3.13	0.00	7.86	3.13	121.76	55,346	100%
172	0.1	154,068	4.8	0.16	3.05	0.00	7.85	3.05	121.64	55,291	100%
174	0.1	153,715	4.8	0.16	2.96	0.00	7.85	2.96	121.52	55,238	100%
176	0.1	153,371	4.8	0.16	2.88	0.00	7.84	2.88	121.41	55,186	100%
178	0.1	153,036	4.8	0.16	2.80	0.00	7.84	2.80	121.30	55,135	100%
180	0.1	152,709	4.8	0.16	2.72	0.00	7.83	2.72	121.19	55,085	100%
182	0.1	152,391	4.8	0.16	2.65	0.00	7.83	2.65	121.08	55,036	100%
184	0.1	152,081	4.8	0.16	2.58	0.00	7.82	2.58	120.98	54,989	100%
186	0.1	151,778	4.8	0.16	2.51	0.00	7.81	2.51	120.87	54,943	100%
188	0.0	151,483	4.8	0.16	2.44	0.00	7.81	2.44	120.77	54,897	100%
190	0.0	151,196	4.8	0.16	2.38	0.00	7.81	2.38	120.68	54,853	100%
192	0.0	150,916	4.8	0.16	2.32	0.00	7.80	2.32	120.58	54,810	100%
194	0.0	150,642	4.8	0.16	2.26	0.00	7.80	2.26	120.49	54,768	100%
196	0.0	150,376	4.8	0.16	2.20	0.00	7.79	2.20	120.40	54,727	100%
198	0.0	150,116	4.8	0.16	2.14	0.00	7.79	2.14	120.31	54,687	100%
200	0.0	149,862	4.7	0.16	2.09	0.00	7.78	2.09	120.23	54,648	100%
202	0.0	149,614	4.7	0.16	2.04	0.00	7.78	2.04	120.14	54,610	100%
204	0.0	149,373	4.7	0.16	1.99	0.00	7.77	1.99	120.06	54,573	100%
206	0.0	149,137	4.7	0.16	1.94	0.00	7.77	1.94	119.98	54,537	100%


Sediment Basin #8 Colon Mine Phase 1 Hydrograph
25-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #9	Sheet: 1	Of: 4

Objective Design the sediment basin to contain the 25-year storm and pass the 100-year storm without over topping the berm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. NOAA Atlas 14, Volume 2, Version 3
4. VA Erosion and Sediment Control Handbook

Given

Phase	1	2	2	2		
Storm Event (yrs) =	10	10	25	100		
Total Drainage Area A (ac) =	62.8	85.9	85.9	85.9		
Disturbed Area (ac) =	46.7	65.9	65.9	65.9		
Curve Number CN =	72	72	72	72	Hydrographs	
Rainfall Depth P (in) =	5.28	5.28	6.28	7.88	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	145.70	199.50	268.73	384.06	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	154,620	cf (based on largest Phase)
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	86,783	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
262	0	88,670	0	0	0
263	1	92,409	90,533	90,533	3,353
264	2	96,226	94,311	184,844	6,846
265	3	100,091	98,152	282,996	10,481
266	4	103,992	102,035	385,032	14,260
267	5	107,938	105,959	490,990	18,185
268	6	111,933	109,929	600,920	22,256

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 282,996 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 3
Surface Area (sf) = 100,091 *Required Surface Area Achieved*

Project:	Charah Colon Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #9	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Sizes (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	282,996		
Number of Skimmers	2		
Days to Drain =	5	*assumed*	
Q each (cf/day) =	28,300	0.33	cfs
Selected Skimmer Size (inches) =	5		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	4.6		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) = $(P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) = $60.5(Q^*)A/Q_P/1.39$

Phase	1	2	2	2
Storm Event (yrs) =	10	10	25	100
S =	3.89	3.89	3.89	3.89
Runoff Depth Q* (inches) =	2.42	2.42	3.22	4.59
Time to Peak T_p (min) =	45.32	45.27	44.85	44.68

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	282,996
Z_2 (ft) =	6	S_2 (cf) =	600,920

b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ = 1.1 Ref 2, III-8

$K_S = S_2/Z_2^b$ = 85,791

Project:	Charah Colon Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #9	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor = 3.281 ft/sec per m/sec

Gravitational Acceleration, g (m/s^2) = 9.81

Specific Gravity of soil (s_s) = 2.6

Kinematic Viscosity of water (υ) = 1.14E-06 n^2 / sec @ 20° C — Ref 2, IV-11

Diameter of the Design Particle d_{15} = 40.00E-06 m

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / \upsilon] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 7.50

Set Top of Dam at (ft) = 8.50

See Hydrograph

Emergency Spillway

Q_E (cfs) = 100-Yr Storm

Q_E (cfs) = 55.2

Cross Section = Trapezoid

Channel Side Slope (z) = 5 (enter X for X:1)

n = 0.03 Grass Lined

Vp (ft/sec) = 5.0 Permissible Velocity for lining — Ref 2, II-7

Allowable Shear Stress (psf) = 2.0 Allowable Shear Stress for lining

Bottom Width, b (ft) = 50

Calculate Required Depth of Spillway:

Normal-Depth Procedure

$AR^{2/3}=Qn/1.49s^{0.5}$ Q=VA

$Z_{req}=Qn/1.49s^{0.5}$ Area (A)= bd+z(d^2)

$Z_{av}=AR^{2/3}$ R=Area/(b+2d((z^2)+1)^.5)

Avg Shear Stress(T) = K_b*d*s*unit weight of water

Channel Slope ft/ft	Depth, d (ft)	A (sf)	Z_{req}	R	Z_{avail}	V (ft/sec)	T (psf)
0.01	0.40	20.94	11.12	0.39	11.12	2.6	0.3
0.02	0.33	16.91	7.86	0.32	7.86	3.3	0.4

Construct the channel to be : 50 ft, Bottom Width (measured at top of lining)

1.0 ft, depth (measured at top of lining)

1% slope

Anti-Seep Collar:

Anti-Seep Collar Size = 2 * Barrel Dia

Anti-Seep Collar Size (ft) = 7

Use Anti-Seep Collar Size (ft) = 7 x 7

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #9	Sheet: 4	Of: 4

Minimum Concrete Base for Riser:

Diameter of Riser (in) =	72	From Hydrograph
Avg Density of Concrete (lbs/cf) =	87.6	
Density of Water (lbs/cf) =	62.4	
Riser Displacement (cf) =	189.44	Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy =	27^{-1}	
Min Concrete Needed (cy) =	5.00	
Width & Length (ft) =	7	
Thickness (ft) =	2.8	

Anti-Vortex Device:

Diameter of Riser (in) =	72	From Hydrograph
Cylinder Diameter (in) =	102	Ref 4, III-104, Table 3.14-D
Cylinder Thickness (gage) =	14	
Cylinder Height (in) =	36	

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	10.5	6 * Barrel Diameter
Q_B (cfs) =	85.1	Peak Flow out of the barrel 25-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
85.1	27.88	1.50	27.0	1.05	27.88	3.1

Flow Depth = Tailwater, d (ft) = 1.50 0.5* Barrel Diameter (ft) = 1.75 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
3.5	10.5	22	26	0.7	Class B

Conclusion

The basin can contain the 25-yr storm and pass the 100-yr storm without overtopping the berm.

HDR Computation

Job No. 0453925-23673-018

Project:	Charah Colon Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	72	
Circumference of Riser (in) =	226.2	
Height of Riser from bottom of barrel (in) =	80	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	2	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.66	0.66
0.39	0.00	0.00	0.00			0.66	0.66
0.44	0.00	0.00	0.00			0.66	0.66
0.49	0.00	0.00	0.00			0.66	0.66
0.54	0.00	0.00	0.00			0.66	0.66
0.59	0.00	0.00	0.00			0.66	0.66
0.64	0.00	0.00	0.00			0.66	0.66
0.69	0.00	0.00	0.00			0.66	0.66
0.74	0.00	0.00	0.00			0.66	0.66
0.79	0.00	0.00	0.00			0.66	0.66
0.84	0.00	0.00	0.00			0.66	0.66
0.89	0.00	0.00	0.00			0.66	0.66
0.94	0.00	0.00	0.00			0.66	0.66
0.99	0.00	0.00	0.00			0.66	0.66
1.04	0.00	0.00	0.00			0.66	0.66
1.09	0.00	0.00	0.00			0.66	0.66
1.14	0.00	0.00	0.00			0.66	0.66
1.19	0.00	0.00	0.00			0.66	0.66
1.24	0.00	0.00	0.00			0.66	0.66
1.29	0.00	0.00	0.00			0.66	0.66
1.34	0.00	0.00	0.00			0.66	0.66
1.39	0.00	0.00	0.00			0.66	0.66
1.44	0.00	0.00	0.00			0.66	0.66
1.49	0.00	0.00	0.00			0.66	0.66
1.54	0.00	0.00	0.00			0.66	0.66
1.59	0.00	0.00	0.00			0.66	0.66

1.64	0.00	0.00	0.00	0.66	0.66
1.69	0.00	0.00	0.00	0.66	0.66
1.74	0.00	0.00	0.00	0.66	0.66
1.79	0.00	0.00	0.00	0.66	0.66
1.84	0.00	0.00	0.00	0.66	0.66
1.89	0.00	0.00	0.00	0.66	0.66
1.94	0.00	0.00	0.00	0.66	0.66
1.99	0.00	0.00	0.00	0.66	0.66
2.04	0.00	0.00	0.00	0.66	0.66
2.09	0.00	0.00	0.00	0.66	0.66
2.14	0.00	0.00	0.00	0.66	0.66
2.19	0.00	0.00	0.00	0.66	0.66
2.24	0.00	0.00	0.00	0.66	0.66
2.29	0.00	0.00	0.00	0.66	0.66
2.34	0.00	0.00	0.00	0.66	0.66
2.39	0.00	0.00	0.00	0.66	0.66
2.44	0.00	0.00	0.00	0.66	0.66
2.49	0.00	0.00	0.00	0.66	0.66
2.54	0.00	0.00	0.00	0.66	0.66
2.59	0.00	0.00	0.00	0.66	0.66
2.64	0.00	0.00	0.00	0.66	0.66
2.69	0.00	0.00	0.00	0.66	0.66
2.74	0.00	0.00	0.00	0.66	0.66
2.79	0.00	0.00	0.00	0.66	0.66
2.84	0.00	0.00	0.00	0.66	0.66
2.89	0.00	0.00	0.00	0.66	0.66
2.94	0.00	0.00	0.00	0.66	0.66
2.99	0.00	0.00	0.00	0.66	0.66
3.04	0.00	0.00	0.00	0.66	0.66
3.09	0.00	0.00	0.00	0.66	0.66
3.14	0.00	0.00	0.00	0.66	0.66
3.19	0.00	0.00	0.00	0.66	0.66
3.24	0.00	0.00	0.00	0.66	0.66
3.29	0.00	0.00	0.00	0.66	0.66
3.34	0.00	0.00	0.00	0.66	0.66
3.39	0.00	0.00	0.00	0.66	0.66
3.44	0.00	0.00	0.00	0.66	0.66
3.49	0.00	0.00	0.00	0.66	0.66
3.54	0.00	0.00	0.00	0.66	0.66
3.59	0.00	0.00	0.00	0.66	0.66
3.64	0.00	0.00	0.00	0.66	0.66
3.69	0.00	0.00	0.00	0.66	0.66
3.74	0.00	0.00	0.00	0.66	0.66
3.79	0.00	0.00	0.00	0.66	0.66
3.84	0.00	0.00	0.00	0.66	0.66
3.89	0.00	0.00	0.00	0.66	0.66
3.94	0.00	0.00	0.00	0.66	0.66
3.99	0.00	0.00	0.00	0.66	0.66

Computed By: PAW Date:3/5/15

Checked By: MDP Date: 3/6/15

Sheet: _1___of __2__

Qp = 145.70 cfs

Tp = 45.32 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 9 Colon

Phase 1

10 - year Storm Event

b = 1.1

K_s = 85,791

Number of Riser/Barrel Assemblies	2			
Diameter of Barrel =	42	(in)		
Height of Riser above barrel =	3.2	(ft)		
Height of Riser from bottom of barrel=	6.7	(ft) elevation	268.70	
Emergency Spillway =	7.5	(ft) elevation	269.50	
Total Height of Dam =	8.5	(ft) elevation	270.50	
Length of Emergency Spillway =	50	(ft)		
Diameter of Riser =	72	(in)		
Permanent Pond Stage =	0	(ft) elevation	262.0	

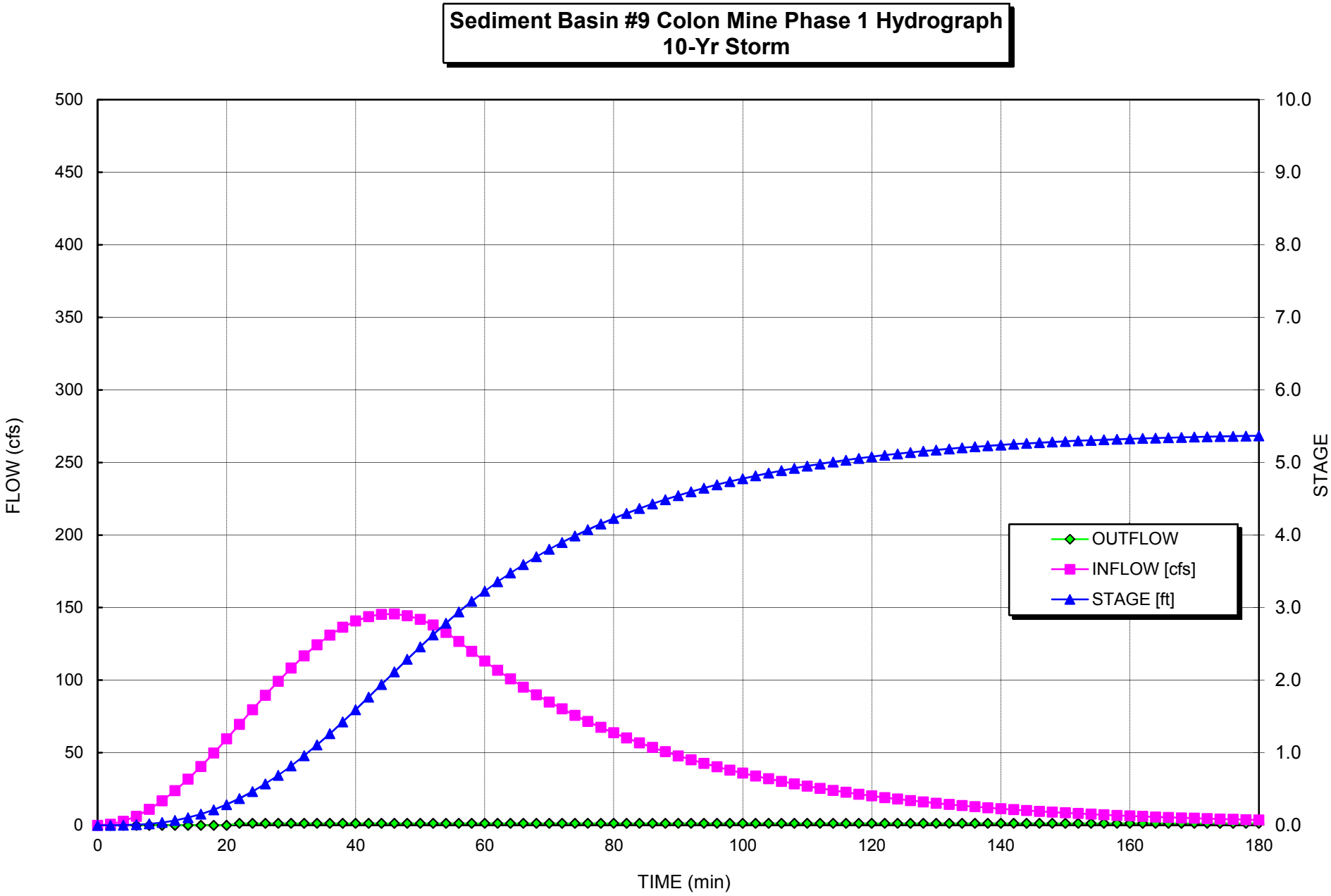
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.4	ft Maximum Stage	267.39	msl elevation
1.3	cfs Peak outflow		
1.3	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	0.7	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	2.8	84	0.0	0.00	0.00	0.00	0.00	0.00	118.17	53,715	N/A
6	6.2	418	0.0	0.00	0.00	0.00	0.00	0.00	134.27	61,030	N/A
8	10.9	1,163	0.0	0.00	0.00	0.00	0.00	0.00	145.65	66,206	N/A
10	16.8	2,473	0.0	0.00	0.00	0.00	0.00	0.00	154.66	70,300	N/A
12	23.8	4,491	0.1	0.00	0.00	0.00	0.00	0.00	162.17	73,715	N/A
14	31.7	7,345	0.1	0.00	0.00	0.00	0.00	0.00	168.64	76,656	N/A
16	40.4	11,149	0.2	0.00	0.00	0.00	0.00	0.00	174.33	79,242	N/A
18	49.7	15,998	0.2	0.00	0.00	0.00	0.00	0.00	179.41	81,550	N/A
20	59.5	21,965	0.3	0.00	0.00	0.00	0.00	0.00	183.99	83,632	N/A
22	69.5	29,104	0.4	0.66	0.66	0.00	0.66	1.31	188.16	85,525	100%
24	79.6	37,290	0.5	0.66	0.66	0.00	0.66	1.31	191.90	87,227	100%
26	89.6	46,686	0.6	0.66	0.66	0.00	0.66	1.31	195.36	88,800	100%
28	99.2	57,277	0.7	0.66	0.66	0.00	0.66	1.31	198.56	90,256	100%
30	108.3	69,025	0.8	0.66	0.66	0.00	0.66	1.31	201.53	91,605	100%
32	116.8	81,869	1.0	0.66	0.66	0.00	0.66	1.31	204.28	92,856	100%
34	124.4	95,727	1.1	0.66	0.66	0.00	0.66	1.31	206.84	94,018	100%
36	131.0	110,498	1.3	0.66	0.66	0.00	0.66	1.31	209.21	95,097	100%
38	136.5	126,064	1.4	0.66	0.66	0.00	0.66	1.31	211.42	96,099	100%
40	140.8	142,289	1.6	0.66	0.66	0.00	0.66	1.31	213.46	97,029	100%
42	143.8	159,029	1.8	0.66	0.66	0.00	0.66	1.31	215.36	97,891	100%
44	145.4	176,125	1.9	0.66	0.66	0.00	0.66	1.31	217.12	98,689	100%
46	145.6	193,415	2.1	0.66	0.66	0.00	0.66	1.31	218.74	99,426	100%
48	144.4	210,732	2.3	0.66	0.66	0.00	0.66	1.31	220.23	100,107	100%
50	141.9	227,909	2.5	0.66	0.66	0.00	0.66	1.31	221.61	100,732	100%
52	138.0	244,779	2.6	0.66	0.66	0.00	0.66	1.31	222.87	101,306	100%
54	132.9	261,185	2.8	0.66	0.66	0.00	0.66	1.31	224.03	101,830	100%
56	126.6	276,976	2.9	0.66	0.66	0.00	0.66	1.31	225.07	102,306	100%
58	119.8	292,013	3.1	0.66	0.66	0.00	0.66	1.31	226.02	102,737	100%
60	113.1	306,229	3.2	0.66	0.66	0.00	0.66	1.31	226.88	103,126	100%
62	106.8	319,644	3.4	0.66	0.66	0.00	0.66	1.31	227.65	103,479	100%
64	100.8	332,302	3.5	0.66	0.66	0.00	0.66	1.31	228.36	103,799	100%
66	95.2	344,246	3.6	0.66	0.66	0.00	0.66	1.31	229.00	104,091	100%
68	89.9	355,514	3.7	0.66	0.66	0.00	0.66	1.31	229.59	104,357	100%
70	84.9	366,146	3.8	0.66	0.66	0.00	0.66	1.31	230.13	104,602	100%
72	80.2	376,176	3.9	0.66	0.66	0.00	0.66	1.31	230.62	104,827	100%
74	75.7	385,638	4.0	0.66	0.66	0.00	0.66	1.31	231.08	105,035	100%
76	71.5	394,564	4.1	0.66	0.66	0.00	0.66	1.31	231.50	105,226	100%
78	67.5	402,984	4.2	0.66	0.66	0.00	0.66	1.31	231.89	105,403	100%
80	63.7	410,925	4.2	0.66	0.66	0.00	0.66	1.31	232.25	105,566	100%
82	60.2	418,414	4.3	0.66	0.66	0.00	0.66	1.31	232.58	105,718	100%

84	56.8	425,478	4.4	0.66	0.66	0.00	0.66	1.31	232.89	105,859	100%
86	53.6	432,138	4.4	0.66	0.66	0.00	0.66	1.31	233.18	105,990	100%
88	50.7	438,419	4.5	0.66	0.66	0.00	0.66	1.31	233.45	106,112	100%
90	47.8	444,340	4.5	0.66	0.66	0.00	0.66	1.31	233.69	106,225	100%
92	45.2	449,923	4.6	0.66	0.66	0.00	0.66	1.31	233.93	106,330	100%
94	42.6	455,185	4.6	0.66	0.66	0.00	0.66	1.31	234.14	106,429	100%
96	40.3	460,146	4.7	0.66	0.66	0.00	0.66	1.31	234.34	106,520	100%
98	38.0	464,821	4.7	0.66	0.66	0.00	0.66	1.31	234.53	106,606	100%
100	35.9	469,226	4.8	0.66	0.66	0.00	0.66	1.31	234.71	106,686	100%
102	33.9	473,378	4.8	0.66	0.66	0.00	0.66	1.31	234.87	106,761	100%
104	32.0	477,289	4.9	0.66	0.66	0.00	0.66	1.31	235.03	106,831	100%
106	30.2	480,973	4.9	0.66	0.66	0.00	0.66	1.31	235.17	106,896	100%
108	28.5	484,443	4.9	0.66	0.66	0.00	0.66	1.31	235.31	106,957	100%
110	26.9	487,710	5.0	0.66	0.66	0.00	0.66	1.31	235.43	107,014	100%
112	25.4	490,787	5.0	0.66	0.66	0.00	0.66	1.31	235.55	107,068	100%
114	24.0	493,684	5.0	0.66	0.66	0.00	0.66	1.31	235.66	107,118	100%
116	22.7	496,410	5.0	0.66	0.66	0.00	0.66	1.31	235.76	107,165	100%
118	21.4	498,975	5.1	0.66	0.66	0.00	0.66	1.31	235.86	107,209	100%
120	20.2	501,389	5.1	0.66	0.66	0.00	0.66	1.31	235.95	107,250	100%
122	19.1	503,659	5.1	0.66	0.66	0.00	0.66	1.31	236.03	107,289	100%
124	18.0	505,794	5.1	0.66	0.66	0.00	0.66	1.31	236.11	107,325	100%
126	17.0	507,801	5.1	0.66	0.66	0.00	0.66	1.31	236.19	107,358	100%
128	16.1	509,688	5.2	0.66	0.66	0.00	0.66	1.31	236.26	107,390	100%
130	15.2	511,460	5.2	0.66	0.66	0.00	0.66	1.31	236.32	107,420	100%
132	14.3	513,125	5.2	0.66	0.66	0.00	0.66	1.31	236.38	107,448	100%
134	13.5	514,688	5.2	0.66	0.66	0.00	0.66	1.31	236.44	107,474	100%
136	12.8	516,156	5.2	0.66	0.66	0.00	0.66	1.31	236.50	107,498	100%
138	12.1	517,532	5.2	0.66	0.66	0.00	0.66	1.31	236.55	107,521	100%
140	11.4	518,824	5.2	0.66	0.66	0.00	0.66	1.31	236.59	107,542	100%
142	10.8	520,034	5.3	0.66	0.66	0.00	0.66	1.31	236.64	107,562	100%
144	10.2	521,168	5.3	0.66	0.66	0.00	0.66	1.31	236.68	107,580	100%
146	9.6	522,231	5.3	0.66	0.66	0.00	0.66	1.31	236.72	107,598	100%
148	9.1	523,225	5.3	0.66	0.66	0.00	0.66	1.31	236.75	107,614	100%
150	8.6	524,155	5.3	0.66	0.66	0.00	0.66	1.31	236.78	107,629	100%
152	8.1	525,024	5.3	0.66	0.66	0.00	0.66	1.31	236.82	107,644	100%
154	7.6	525,836	5.3	0.66	0.66	0.00	0.66	1.31	236.84	107,657	100%
156	7.2	526,595	5.3	0.66	0.66	0.00	0.66	1.31	236.87	107,669	100%
158	6.8	527,302	5.3	0.66	0.66	0.00	0.66	1.31	236.90	107,681	100%
160	6.4	527,960	5.3	0.66	0.66	0.00	0.66	1.31	236.92	107,691	100%
162	6.1	528,574	5.3	0.66	0.66	0.00	0.66	1.31	236.94	107,701	100%
164	5.7	529,144	5.3	0.66	0.66	0.00	0.66	1.31	236.96	107,711	100%
166	5.4	529,674	5.3	0.66	0.66	0.00	0.66	1.31	236.98	107,719	100%
168	5.1	530,166	5.3	0.66	0.66	0.00	0.66	1.31	237.00	107,727	100%
170	4.8	530,621	5.4	0.66	0.66	0.00	0.66	1.31	237.02	107,734	100%
172	4.6	531,042	5.4	0.66	0.66	0.00	0.66	1.31	237.03	107,741	100%
174	4.3	531,431	5.4	0.66	0.66	0.00	0.66	1.31	237.04	107,747	100%
176	4.1	531,790	5.4	0.66	0.66	0.00	0.66	1.31	237.06	107,753	100%
178	3.8	532,119	5.4	0.66	0.66	0.00	0.66	1.31	237.07	107,759	100%
180	3.6	532,422	5.4	0.66	0.66	0.00	0.66	1.31	237.08	107,763	100%
182	3.4	532,699	5.4	0.66	0.66	0.00	0.66	1.31	237.09	107,768	100%
184	3.2	532,952	5.4	0.66	0.66	0.00	0.66	1.31	237.10	107,772	100%
186	3.0	533,182	5.4	0.66	0.66	0.00	0.66	1.31	237.11	107,776	100%
188	2.9	533,390	5.4	0.66	0.66	0.00	0.66	1.31	237.11	107,779	100%
190	2.7	533,578	5.4	0.66	0.66	0.00	0.66	1.31	237.12	107,782	100%
192	2.6	533,747	5.4	0.66	0.66	0.00	0.66	1.31	237.13	107,785	100%
194	2.4	533,897	5.4	0.66	0.66	0.00	0.66	1.31	237.13	107,787	100%
196	2.3	534,030	5.4	0.66	0.66	0.00	0.66	1.31	237.14	107,789	100%
198	2.2	534,148	5.4	0.66	0.66	0.00	0.66	1.31	237.14	107,791	100%
200	2.0	534,249	5.4	0.66	0.66	0.00	0.66	1.31	237.14	107,793	100%
202	1.9	534,337	5.4	0.66	0.66	0.00	0.66	1.31	237.15	107,794	100%
204	1.8	534,411	5.4	0.66	0.66	0.00	0.66	1.31	237.15	107,795	100%
206	1.7	534,471	5.4	0.66	0.66	0.00	0.66	1.31	237.15	107,796	100%


Sediment Basin #9 Colon Mine Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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Computed By: PAW Date: 12/31/14

Checked By: EAW Date: 1/2/15

Sheet: _1___of _2_

Sediment Basin # 9 Colon

Phase 2

10 - year Storm Event

Qp =	199.50	cfs
Tp =	45.27	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	42	(in)	
Height of Riser above barrel =	3.2	(ft)	
Height of Riser from bottom of barrel=	6.7	(ft) elevation	268.70
Emergency Spillway =	7.5	(ft) elevation	269.50
Total Height of Dam =	8.5	(ft) elevation	270.50
Length of Emergency Spillway =	50	(ft)	
Diameter of Riser =	72	(in)	
Permanent Pond Stage =	0	(ft) elevation	262.0

b = 1.1

Ks = 85,791

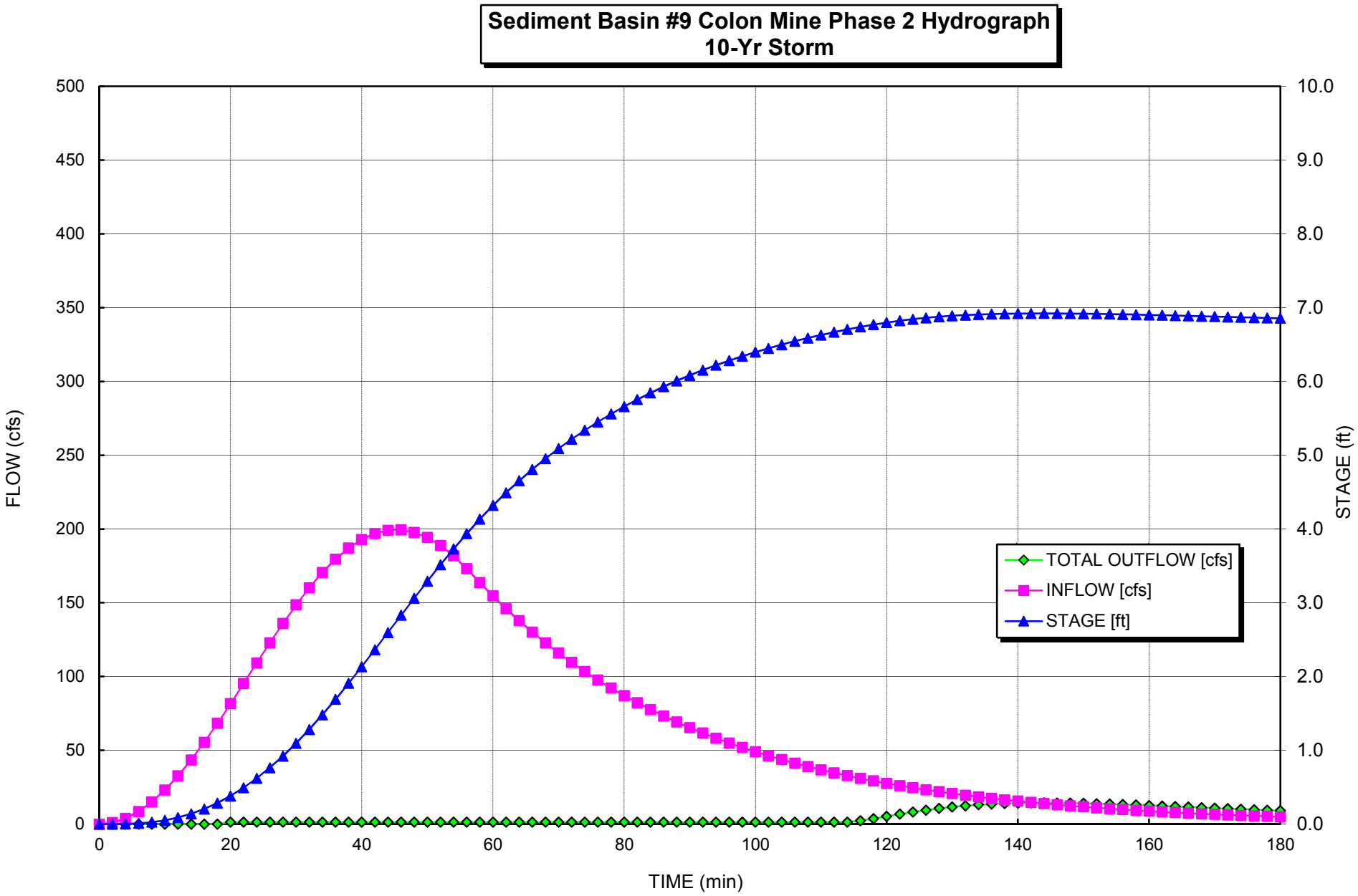
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
6.9	ft Maximum Stage	268.92	msl elevation
14.3	cfs Peak outflow		
14.3	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	3.8	115	0.0	0.00	0.00	0.00	0.00	0.00	121.18	55,083	N/A
6	8.5	573	0.0	0.00	0.00	0.00	0.00	0.00	137.69	62,584	N/A
8	15.0	1,596	0.0	0.00	0.00	0.00	0.00	0.00	149.36	67,893	N/A
10	23.1	3,394	0.1	0.00	0.00	0.00	0.00	0.00	158.60	72,091	N/A
12	32.6	6,162	0.1	0.00	0.00	0.00	0.00	0.00	166.30	75,592	N/A
14	43.5	10,078	0.1	0.00	0.00	0.00	0.00	0.00	172.94	78,608	N/A
16	55.4	15,296	0.2	0.00	0.00	0.00	0.00	0.00	178.77	81,260	N/A
18	68.2	21,947	0.3	0.00	0.00	0.00	0.00	0.00	183.98	83,627	N/A
20	81.6	30,132	0.4	0.66	0.66	0.00	0.66	1.31	188.68	85,761	100%
22	95.4	39,768	0.5	0.66	0.66	0.00	0.66	1.31	192.88	87,675	100%
24	109.2	51,053	0.6	0.66	0.66	0.00	0.66	1.31	196.75	89,434	100%
26	122.8	63,997	0.8	0.66	0.66	0.00	0.66	1.31	200.32	91,055	100%
28	136.0	78,579	0.9	0.66	0.66	0.00	0.66	1.31	203.62	92,554	100%
30	148.5	94,745	1.1	0.66	0.66	0.00	0.66	1.31	206.67	93,941	100%
32	160.1	112,413	1.3	0.66	0.66	0.00	0.66	1.31	209.50	95,227	100%
34	170.5	131,468	1.5	0.66	0.66	0.00	0.66	1.31	212.12	96,420	100%
36	179.6	151,772	1.7	0.66	0.66	0.00	0.66	1.31	214.56	97,528	100%
38	187.1	173,161	1.9	0.66	0.66	0.00	0.66	1.31	216.82	98,556	100%
40	192.9	195,452	2.1	0.66	0.66	0.00	0.66	1.31	218.92	99,509	100%
42	196.9	218,443	2.4	0.66	0.66	0.00	0.66	1.31	220.86	100,393	100%
44	199.1	241,919	2.6	0.66	0.66	0.00	0.66	1.31	222.66	101,211	100%
46	199.4	265,655	2.8	0.66	0.66	0.00	0.66	1.31	224.33	101,967	100%
48	197.7	289,422	3.1	0.66	0.66	0.00	0.66	1.31	225.86	102,665	100%
50	194.2	312,991	3.3	0.66	0.66	0.00	0.66	1.31	227.27	103,306	100%
52	188.8	336,135	3.5	0.66	0.66	0.00	0.66	1.31	228.57	103,893	100%
54	181.8	358,637	3.7	0.66	0.66	0.00	0.66	1.31	229.75	104,430	100%
56	173.1	380,290	3.9	0.66	0.66	0.00	0.66	1.31	230.82	104,918	100%
58	163.7	400,906	4.1	0.66	0.66	0.00	0.66	1.31	231.79	105,359	100%
60	154.6	420,396	4.3	0.66	0.66	0.00	0.66	1.31	232.67	105,758	100%
62	146.0	438,789	4.5	0.66	0.66	0.00	0.66	1.31	233.46	106,119	100%
64	137.8	456,147	4.7	0.66	0.66	0.00	0.66	1.31	234.18	106,447	100%
66	130.1	472,527	4.8	0.66	0.66	0.00	0.66	1.31	234.84	106,746	100%
68	122.9	487,984	5.0	0.66	0.66	0.00	0.66	1.31	235.44	107,019	100%
70	116.0	502,570	5.1	0.66	0.66	0.00	0.66	1.31	235.99	107,270	100%
72	109.5	516,332	5.2	0.66	0.66	0.00	0.66	1.31	236.50	107,501	100%
74	103.4	529,318	5.3	0.66	0.66	0.00	0.66	1.31	236.97	107,713	100%
76	97.6	541,571	5.5	0.66	0.66	0.00	0.66	1.31	237.40	107,910	100%
78	92.2	553,131	5.6	0.66	0.66	0.00	0.66	1.31	237.80	108,091	100%
80	87.0	564,036	5.7	0.66	0.66	0.00	0.66	1.31	238.17	108,259	100%
82	82.2	574,325	5.8	0.66	0.66	0.00	0.66	1.31	238.51	108,415	100%
84	77.6	584,030	5.8	0.66	0.66	0.00	0.66	1.31	238.83	108,559	100%

86	73.3	593,185	5.9	0.66	0.66	0.00	0.66	1.31	239.13	108,693	100%
88	69.2	601,820	6.0	0.66	0.66	0.00	0.66	1.31	239.40	108,818	100%
90	65.3	609,964	6.1	0.66	0.66	0.00	0.66	1.31	239.66	108,935	100%
92	61.7	617,645	6.2	0.66	0.66	0.00	0.66	1.31	239.90	109,043	100%
94	58.2	624,889	6.2	0.66	0.66	0.00	0.66	1.31	240.12	109,144	100%
96	55.0	631,720	6.3	0.66	0.66	0.00	0.66	1.31	240.33	109,239	100%
98	51.9	638,160	6.3	0.66	0.66	0.00	0.66	1.31	240.52	109,327	100%
100	49.0	644,232	6.4	0.66	0.66	0.00	0.66	1.31	240.70	109,409	100%
102	46.3	649,957	6.4	0.66	0.66	0.00	0.66	1.31	240.87	109,486	100%
104	43.7	655,353	6.5	0.66	0.66	0.00	0.66	1.31	241.03	109,558	100%
106	41.3	660,440	6.5	0.66	0.66	0.00	0.66	1.31	241.18	109,626	100%
108	39.0	665,233	6.6	0.66	0.66	0.00	0.66	1.31	241.32	109,689	100%
110	36.8	669,751	6.6	0.66	0.66	0.00	0.66	1.31	241.45	109,748	100%
112	34.7	674,007	6.7	0.66	0.66	0.00	0.66	1.31	241.57	109,803	100%
114	32.8	678,017	6.7	0.66	0.68	0.00	102.96	1.36	241.68	109,855	100%
116	31.0	681,789	6.7	0.66	1.14	0.00	103.31	2.28	241.79	109,903	100%
118	29.2	685,230	6.8	0.66	1.83	0.00	103.64	3.65	241.88	109,947	100%
120	27.6	688,300	6.8	0.66	2.58	0.00	103.92	5.17	241.97	109,987	100%
122	26.1	690,992	6.8	0.66	3.34	0.00	104.18	6.69	242.05	110,021	100%
124	24.6	693,317	6.8	0.66	4.06	0.00	104.39	8.13	242.11	110,050	100%
126	23.2	695,294	6.9	0.66	4.72	0.00	104.58	9.44	242.16	110,075	100%
128	21.9	696,949	6.9	0.66	5.30	0.00	104.73	10.60	242.21	110,096	100%
130	20.7	698,310	6.9	0.66	5.79	0.00	104.86	11.58	242.25	110,113	100%
132	19.6	699,405	6.9	0.66	6.20	0.00	104.96	12.40	242.28	110,127	100%
134	18.5	700,264	6.9	0.66	6.53	0.00	105.04	13.06	242.30	110,137	100%
136	17.4	700,912	6.9	0.66	6.78	0.00	105.10	13.56	242.32	110,145	100%
138	16.5	701,377	6.9	0.66	6.96	0.00	105.14	13.93	242.33	110,151	100%
140	15.5	701,681	6.9	0.66	7.08	0.00	105.17	14.17	242.34	110,155	100%
142	14.7	701,846	6.9	0.66	7.15	0.00	105.18	14.30	242.35	110,157	100%
144	13.9	701,891	6.9	0.66	7.17	0.00	105.19	14.34	242.35	110,158	100%
146	13.1	701,833	6.9	0.66	7.14	0.00	105.18	14.29	242.35	110,157	100%
148	12.4	701,688	6.9	0.66	7.09	0.00	105.17	14.17	242.34	110,155	100%
150	11.7	701,469	6.9	0.66	7.00	0.00	105.15	14.00	242.34	110,152	100%
152	11.0	701,189	6.9	0.66	6.89	0.00	105.12	13.78	242.33	110,149	100%
154	10.4	700,857	6.9	0.66	6.76	0.00	105.09	13.52	242.32	110,145	100%
156	9.8	700,482	6.9	0.66	6.61	0.00	105.06	13.23	242.31	110,140	100%
158	9.3	700,073	6.9	0.66	6.46	0.00	105.02	12.91	242.30	110,135	100%
160	8.8	699,636	6.9	0.66	6.29	0.00	104.98	12.58	242.28	110,129	100%
162	8.3	699,177	6.9	0.66	6.11	0.00	104.94	12.23	242.27	110,124	100%
164	7.8	698,701	6.9	0.66	5.94	0.00	104.89	11.87	242.26	110,118	100%
166	7.4	698,212	6.9	0.66	5.76	0.00	104.85	11.51	242.25	110,112	100%
168	7.0	697,715	6.9	0.66	5.57	0.00	104.80	11.15	242.23	110,105	100%
170	6.6	697,212	6.9	0.66	5.39	0.00	104.76	10.78	242.22	110,099	100%
172	6.2	696,706	6.9	0.66	5.21	0.00	104.71	10.42	242.20	110,093	100%
174	5.9	696,199	6.9	0.66	5.03	0.00	104.66	10.07	242.19	110,086	100%
176	5.5	695,694	6.9	0.66	4.86	0.00	104.61	9.71	242.18	110,080	100%
178	5.2	695,191	6.9	0.66	4.68	0.00	104.57	9.37	242.16	110,074	100%
180	4.9	694,693	6.9	0.66	4.52	0.00	104.52	9.03	242.15	110,067	100%
182	4.7	694,201	6.9	0.66	4.35	0.00	104.48	8.70	242.13	110,061	100%
184	4.4	693,715	6.8	0.66	4.19	0.00	104.43	8.39	242.12	110,055	100%
186	4.1	693,236	6.8	0.66	4.04	0.00	104.39	8.07	242.11	110,049	100%
188	3.9	692,764	6.8	0.66	3.89	0.00	104.34	7.77	242.09	110,043	100%
190	3.7	692,301	6.8	0.66	3.74	0.00	104.30	7.48	242.08	110,037	100%
192	3.5	691,847	6.8	0.66	3.60	0.00	104.26	7.20	242.07	110,031	100%
194	3.3	691,402	6.8	0.66	3.47	0.00	104.21	6.93	242.06	110,026	100%
196	3.1	690,965	6.8	0.66	3.34	0.00	104.17	6.67	242.04	110,020	100%
198	2.9	690,538	6.8	0.66	3.21	0.00	104.13	6.42	242.03	110,015	100%
200	2.8	690,121	6.8	0.66	3.09	0.00	104.10	6.18	242.02	110,010	100%
202	2.6	689,713	6.8	0.66	2.97	0.00	104.06	5.94	242.01	110,004	100%
204	2.5	689,314	6.8	0.66	2.86	0.00	104.02	5.72	242.00	109,999	100%


Sediment Basin #9 Colon Mine Phase 2 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE (ft)
TIME (min)
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
TOTAL OUTFLOW [cfs]
INFLOW [cfs]
STAGE [ft]

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Computed By: PAW Date: 12/31/14

Checked By: EAW Date: 1/2/15

Sheet: __1__of __2__

Qp = 268.73 cfs

Tp = 44.85 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 9 Colon

Phase 2

25 - year Storm Event

b = 1.1

Ks = 85,791

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	42	(in)	
Height of Riser above barrel =	3.2	(ft)	
Height of Riser from bottom of barrel=	6.7	(ft) elevation	268.70
Emergency Spillway =	7.5	(ft) elevation	269.50
Total Height of Dam =	8.5	(ft) elevation	270.50
Length of Emergency Spillway =	50	(ft)	
Diameter of Riser =	72	(in)	
Permanent Pond Stage =	0	(ft) elevation	262.0

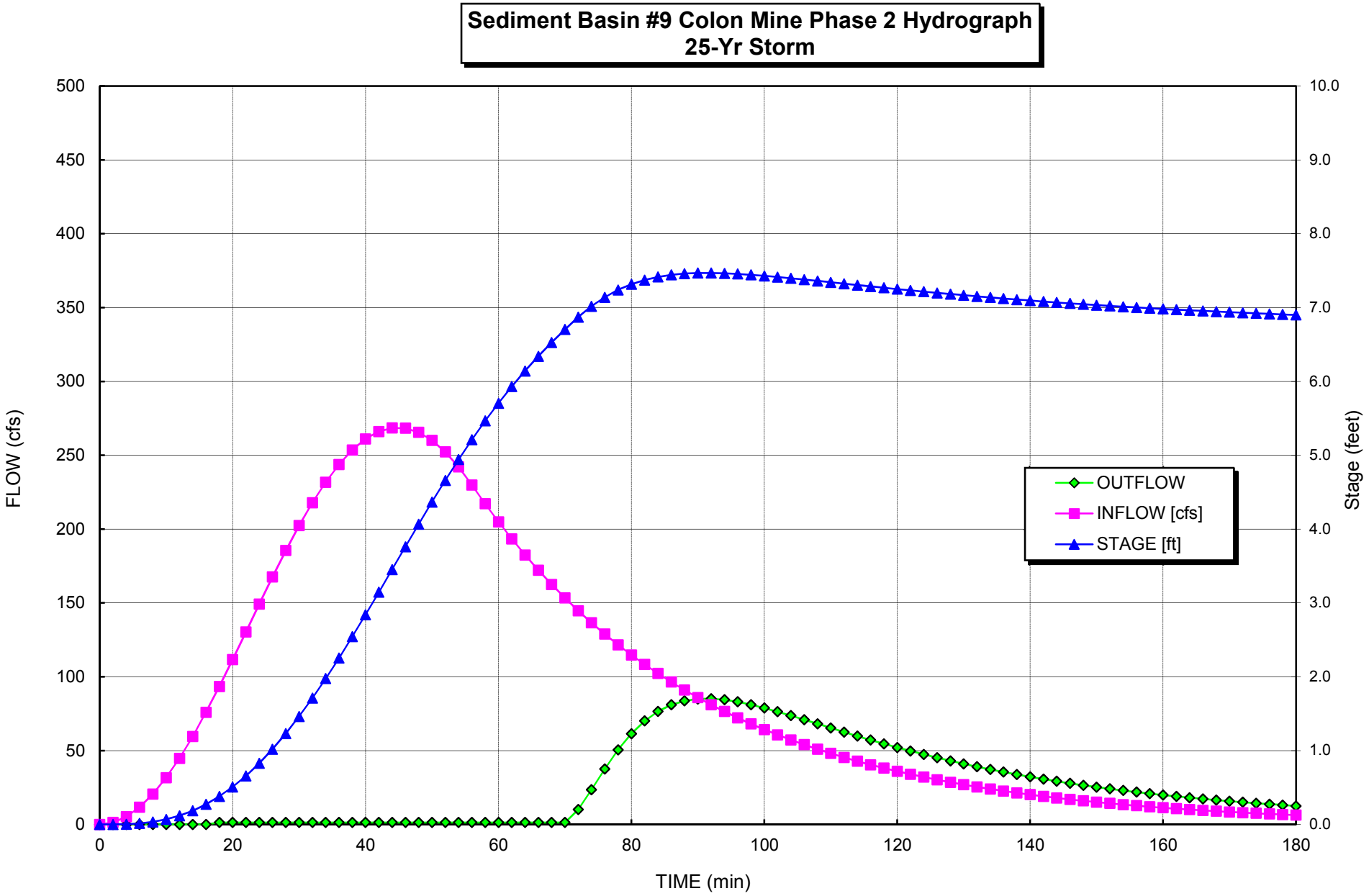
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
92%	Minimum Settling Efficiency		
7.5	ft Maximum Stage	269.5	msl elevation
85.1	cfs Peak outflow		
85.1	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	5.2	158	0.0	0.00	0.00	0.00	0.00	0.00	124.27	56,487	N/A
6	11.7	787	0.0	0.00	0.00	0.00	0.00	0.00	141.19	64,179	N/A
8	20.5	2,190	0.0	0.00	0.00	0.00	0.00	0.00	153.17	69,622	N/A
10	31.6	4,656	0.1	0.00	0.00	0.00	0.00	0.00	162.64	73,926	N/A
12	44.7	8,452	0.1	0.00	0.00	0.00	0.00	0.00	170.54	77,516	N/A
14	59.6	13,820	0.2	0.00	0.00	0.00	0.00	0.00	177.34	80,607	N/A
16	75.9	20,971	0.3	0.00	0.00	0.00	0.00	0.00	183.31	83,325	N/A
18	93.4	30,080	0.4	0.66	0.66	0.00	0.66	1.31	188.65	85,750	100%
20	111.6	41,128	0.5	0.66	0.66	0.00	0.66	1.31	193.40	87,909	100%
22	130.4	54,368	0.7	0.66	0.66	0.00	0.66	1.31	197.74	89,882	100%
24	149.2	69,854	0.8	0.66	0.66	0.00	0.66	1.31	201.72	91,692	100%
26	167.7	87,595	1.0	0.66	0.66	0.00	0.66	1.31	205.38	93,357	100%
28	185.5	107,556	1.2	0.66	0.66	0.00	0.66	1.31	208.77	94,893	100%
30	202.4	129,659	1.5	0.66	0.66	0.00	0.66	1.31	211.89	96,314	100%
32	217.9	153,785	1.7	0.66	0.66	0.00	0.66	1.31	214.79	97,630	100%
34	231.7	179,772	2.0	0.66	0.66	0.00	0.66	1.31	217.47	98,850	100%
36	243.7	207,424	2.3	0.66	0.66	0.00	0.66	1.31	219.96	99,981	100%
38	253.6	236,514	2.5	0.66	0.66	0.00	0.66	1.31	222.27	101,030	100%
40	261.0	266,783	2.8	0.66	0.66	0.00	0.66	1.31	224.40	102,002	100%
42	266.1	297,951	3.1	0.66	0.66	0.00	0.66	1.31	226.38	102,902	100%
44	268.5	329,721	3.5	0.66	0.66	0.00	0.66	1.31	228.22	103,734	100%
46	268.3	361,783	3.8	0.66	0.66	0.00	0.66	1.31	229.91	104,503	100%
48	265.5	393,821	4.1	0.66	0.66	0.00	0.66	1.31	231.46	105,210	100%
50	260.1	425,521	4.4	0.66	0.66	0.00	0.66	1.31	232.89	105,860	100%
52	252.2	456,574	4.7	0.66	0.66	0.00	0.66	1.31	234.20	106,454	100%
54	242.1	486,685	4.9	0.66	0.66	0.00	0.66	1.31	235.39	106,996	100%
56	229.8	515,577	5.2	0.66	0.66	0.00	0.66	1.31	236.47	107,488	100%
58	217.1	542,996	5.5	0.66	0.66	0.00	0.66	1.31	237.45	107,932	100%
60	204.9	568,894	5.7	0.66	0.66	0.00	0.66	1.31	238.33	108,333	100%
62	193.4	593,324	5.9	0.66	0.66	0.00	0.66	1.31	239.13	108,696	100%
64	182.5	616,370	6.1	0.66	0.66	0.00	0.66	1.31	239.86	109,025	100%
66	172.2	638,109	6.3	0.66	0.66	0.00	0.66	1.31	240.52	109,326	100%
68	162.5	658,614	6.5	0.66	0.66	0.00	0.66	1.31	241.12	109,602	100%
70	153.3	677,956	6.7	0.66	0.67	0.00	102.95	1.35	241.68	109,854	100%
72	144.7	696,195	6.9	0.66	5.03	0.00	104.66	10.06	242.19	110,086	100%
74	136.6	712,352	7.0	0.66	11.76	0.00	106.15	23.52	242.63	110,287	99%
76	128.9	725,917	7.1	0.66	18.81	0.00	107.38	37.61	243.00	110,453	98%
78	121.6	736,867	7.2	0.66	25.27	0.00	108.36	50.54	243.29	110,584	97%
80	114.8	745,394	7.3	0.66	30.74	0.00	109.12	61.47	243.51	110,686	95%
82	108.3	751,788	7.4	0.66	35.06	0.00	109.69	70.13	243.67	110,761	94%
84	102.2	756,368	7.4	0.66	38.28	0.00	110.09	76.56	243.79	110,814	93%

86	96.4	759,445	7.4	0.66	40.49	0.00	110.36	80.98	243.87	110,850	93%
88	91.0	761,300	7.5	0.66	41.84	0.00	110.52	83.69	243.92	110,872	93%
90	85.9	762,179	7.5	0.66	42.49	0.00	110.60	84.98	243.94	110,882	92%
92	81.0	762,287	7.5	0.66	42.57	0.00	110.61	85.14	243.94	110,883	92%
94	76.5	761,796	7.5	0.66	42.21	0.00	110.56	84.41	243.93	110,877	92%
96	72.2	760,844	7.5	0.66	41.51	0.00	110.48	83.02	243.91	110,866	93%
98	68.1	759,543	7.4	0.66	40.56	0.00	110.37	81.12	243.87	110,851	93%
100	64.3	757,981	7.4	0.66	39.43	0.00	110.23	78.86	243.83	110,833	93%
102	60.7	756,230	7.4	0.66	38.18	0.00	110.08	76.36	243.79	110,813	93%
104	57.2	754,345	7.4	0.66	36.85	0.00	109.91	73.69	243.74	110,791	94%
106	54.0	752,370	7.4	0.66	35.47	0.00	109.74	70.93	243.69	110,768	94%
108	51.0	750,340	7.4	0.66	34.07	0.00	109.56	68.13	243.64	110,744	94%
110	48.1	748,280	7.3	0.66	32.67	0.00	109.38	65.33	243.58	110,720	95%
112	45.4	746,212	7.3	0.66	31.28	0.00	109.19	62.56	243.53	110,695	95%
114	42.8	744,152	7.3	0.66	29.92	0.00	109.01	59.84	243.48	110,671	95%
116	40.4	742,112	7.3	0.66	28.59	0.00	108.83	57.18	243.42	110,647	96%
118	38.1	740,101	7.3	0.66	27.30	0.00	108.65	54.60	243.37	110,623	96%
120	36.0	738,126	7.3	0.66	26.06	0.00	108.47	52.11	243.32	110,599	96%
122	34.0	736,192	7.2	0.66	24.86	0.00	108.30	49.71	243.27	110,576	97%
124	32.1	734,303	7.2	0.66	23.70	0.00	108.13	47.40	243.22	110,554	97%
126	30.3	732,462	7.2	0.66	22.59	0.00	107.97	45.19	243.17	110,532	97%
128	28.5	730,669	7.2	0.66	21.53	0.00	107.81	43.07	243.12	110,510	97%
130	26.9	728,927	7.2	0.66	20.52	0.00	107.65	41.04	243.08	110,489	98%
132	25.4	727,235	7.2	0.66	19.55	0.00	107.50	39.10	243.03	110,469	98%
134	24.0	725,594	7.1	0.66	18.63	0.00	107.35	37.25	242.99	110,449	98%
136	22.6	724,002	7.1	0.66	17.74	0.00	107.21	35.49	242.95	110,430	98%
138	21.4	722,460	7.1	0.66	16.90	0.00	107.07	33.81	242.90	110,411	98%
140	20.2	720,967	7.1	0.66	16.10	0.00	106.93	32.21	242.86	110,393	98%
142	19.0	719,521	7.1	0.66	15.34	0.00	106.80	30.69	242.83	110,375	99%
144	18.0	718,122	7.1	0.66	14.62	0.00	106.67	29.24	242.79	110,358	99%
146	16.9	716,768	7.1	0.66	13.93	0.00	106.55	27.86	242.75	110,342	99%
148	16.0	715,458	7.0	0.66	13.27	0.00	106.43	26.54	242.72	110,326	99%
150	15.1	714,192	7.0	0.66	12.65	0.00	106.32	25.29	242.68	110,310	99%
152	14.2	712,967	7.0	0.66	12.05	0.00	106.20	24.11	242.65	110,295	99%
154	13.4	711,783	7.0	0.66	11.49	0.00	106.10	22.98	242.62	110,280	99%
156	12.7	710,637	7.0	0.66	10.95	0.00	105.99	21.91	242.59	110,266	99%
158	12.0	709,530	7.0	0.66	10.44	0.00	105.89	20.89	242.56	110,253	99%
160	11.3	708,460	7.0	0.66	9.96	0.00	105.79	19.92	242.53	110,239	99%
162	10.7	707,425	7.0	0.66	9.50	0.00	105.70	18.99	242.50	110,226	99%
164	10.1	706,424	7.0	0.66	9.06	0.00	105.61	18.12	242.47	110,214	99%
166	9.5	705,457	7.0	0.66	8.64	0.00	105.52	17.28	242.44	110,202	99%
168	9.0	704,522	6.9	0.66	8.25	0.00	105.43	16.49	242.42	110,190	100%
170	8.5	703,617	6.9	0.66	7.87	0.00	105.35	15.74	242.39	110,179	100%
172	8.0	702,743	6.9	0.66	7.51	0.00	105.27	15.02	242.37	110,168	100%
174	7.5	701,897	6.9	0.66	7.17	0.00	105.19	14.34	242.35	110,158	100%
176	7.1	701,079	6.9	0.66	6.85	0.00	105.11	13.69	242.32	110,148	100%
178	6.7	700,288	6.9	0.66	6.54	0.00	105.04	13.08	242.30	110,138	100%
180	6.3	699,523	6.9	0.66	6.25	0.00	104.97	12.49	242.28	110,128	100%
182	6.0	698,783	6.9	0.66	5.97	0.00	104.90	11.93	242.26	110,119	100%
184	5.6	698,067	6.9	0.66	5.70	0.00	104.83	11.40	242.24	110,110	100%
186	5.3	697,375	6.9	0.66	5.45	0.00	104.77	10.90	242.22	110,101	100%
188	5.0	696,704	6.9	0.66	5.21	0.00	104.71	10.42	242.20	110,093	100%
190	4.7	696,056	6.9	0.66	4.98	0.00	104.65	9.96	242.19	110,085	100%
192	4.5	695,428	6.9	0.66	4.77	0.00	104.59	9.53	242.17	110,077	100%
194	4.2	694,820	6.9	0.66	4.56	0.00	104.53	9.12	242.15	110,069	100%
196	4.0	694,232	6.9	0.66	4.36	0.00	104.48	8.72	242.14	110,062	100%
198	3.8	693,662	6.8	0.66	4.18	0.00	104.43	8.35	242.12	110,054	100%
200	3.5	693,110	6.8	0.66	4.00	0.00	104.37	7.99	242.10	110,047	100%
202	3.3	692,576	6.8	0.66	3.83	0.00	104.32	7.66	242.09	110,041	100%
204	3.2	692,058	6.8	0.66	3.67	0.00	104.28	7.33	242.08	110,034	100%
206	3.0	691,557	6.8	0.66	3.51	0.00	104.23	7.03	242.06	110,028	100%


Sediment Basin #9 Colon Mine Phase 2 Hydrograph
25-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: _1__of __2_

Sediment Basin # 9 Colon

Phase 2

100 - year Storm Event

Qp =	384.1	cfs
Tp =	44.7	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.1

Ks = 85,791

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	42	(in)	
Height of Riser above barrel =	3.2	(ft)	
Height of Riser from bottom of barrel=	6.7	(ft) elevation	268.70
Emergency Spillway =	7.5	(ft) elevation	269.50
Total Height of Dam =	8.5	(ft) elevation	270.50
Length of Emergency Spillway =	50	(ft)	
Diameter of Riser =	72	(in)	
Permanent Pond Stage =	0	(ft) elevation	262.0

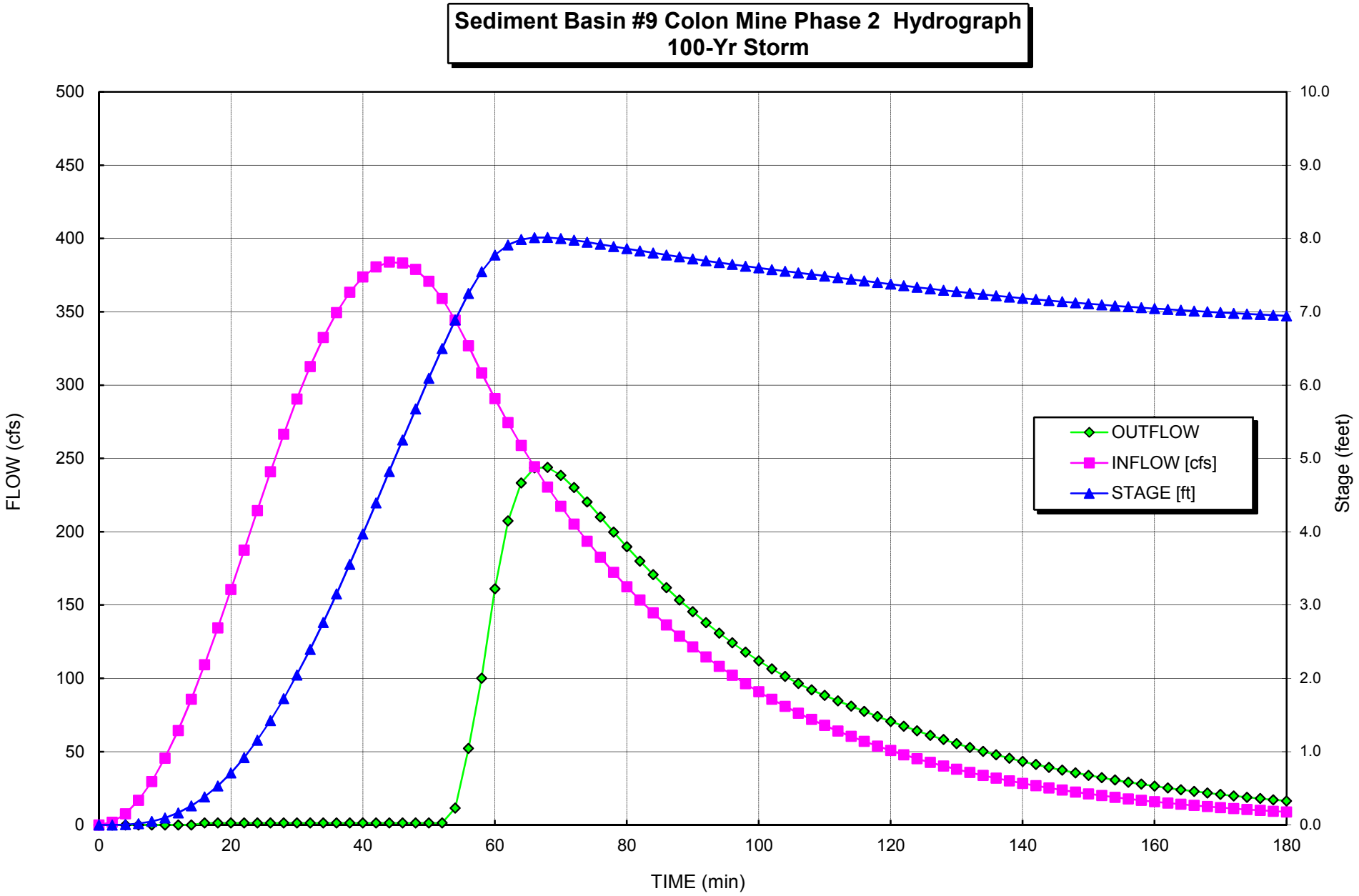
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
73%	Minimum Settling Efficiency		
8.0	ft Maximum Stage	270.0	msl elevation
243.8	cfs Peak outflow		
188.6	cfs Peak Riser/Barrel outflow		
55.2	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.9	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	7.5	228	0.0	0.00	0.00	0.00	0.00	0.00	127.93	58,150	N/A
6	16.8	1,133	0.0	0.00	0.00	0.00	0.00	0.00	145.35	66,068	N/A
8	29.6	3,154	0.0	0.00	0.00	0.00	0.00	0.00	157.68	71,672	N/A
10	45.6	6,705	0.1	0.00	0.00	0.00	0.00	0.00	167.42	76,102	N/A
12	64.4	12,171	0.2	0.00	0.00	0.00	0.00	0.00	175.55	79,797	N/A
14	85.8	19,900	0.3	0.00	0.00	0.00	0.00	0.00	182.55	82,978	N/A
16	109.2	30,193	0.4	0.66	0.66	0.00	0.66	1.31	188.71	85,775	100%
18	134.4	43,145	0.5	0.66	0.66	0.00	0.66	1.31	194.14	88,245	100%
20	160.6	59,110	0.7	0.66	0.66	0.00	0.66	1.31	199.06	90,482	100%
22	187.5	78,225	0.9	0.66	0.66	0.00	0.66	1.31	203.55	92,521	100%
24	214.4	100,563	1.2	0.66	0.66	0.00	0.66	1.31	207.65	94,387	100%
26	240.9	126,135	1.4	0.66	0.66	0.00	0.66	1.31	211.43	96,103	100%
28	266.5	154,890	1.7	0.66	0.66	0.00	0.66	1.31	214.91	97,686	100%
30	290.6	186,710	2.0	0.66	0.66	0.00	0.66	1.31	218.12	99,148	100%
32	312.7	221,419	2.4	0.66	0.66	0.00	0.66	1.31	221.10	100,501	100%
34	332.4	258,784	2.8	0.66	0.66	0.00	0.66	1.31	223.86	101,755	100%
36	349.4	298,519	3.2	0.66	0.66	0.00	0.66	1.31	226.42	102,918	100%
38	363.3	340,291	3.6	0.66	0.66	0.00	0.66	1.31	228.79	103,995	100%
40	373.8	383,728	4.0	0.66	0.66	0.00	0.66	1.31	230.98	104,993	100%
42	380.7	428,423	4.4	0.66	0.66	0.00	0.66	1.31	233.02	105,917	100%
44	383.8	473,946	4.8	0.66	0.66	0.00	0.66	1.31	234.90	106,771	100%
46	383.2	519,850	5.3	0.66	0.66	0.00	0.66	1.31	236.63	107,559	100%
48	378.8	565,680	5.7	0.66	0.66	0.00	0.66	1.31	238.22	108,284	100%
50	370.8	610,984	6.1	0.66	0.66	0.00	0.66	1.31	239.69	108,949	100%
52	359.2	655,318	6.5	0.66	0.66	0.00	0.66	1.31	241.03	109,558	100%
54	344.2	698,260	6.9	0.66	5.77	0.00	104.85	11.55	242.25	110,112	100%
56	326.7	738,184	7.3	0.66	26.09	0.00	108.48	52.19	243.32	110,600	96%
58	308.3	771,132	7.5	0.66	49.26	1.59	111.37	100.11	244.17	110,985	90%
60	290.8	796,112	7.8	0.66	69.80	21.41	113.51	161.02	244.79	111,267	82%
62	274.4	811,692	7.9	0.66	83.76	39.82	114.82	207.33	245.16	111,438	77%
64	258.9	819,740	8.0	0.66	91.29	50.70	115.49	233.27	245.36	111,526	74%
66	244.3	822,814	8.0	0.66	94.22	55.08	115.75	243.52	245.43	111,559	73%
68	230.4	822,903	8.0	0.66	94.30	55.21	115.76	243.81	245.43	111,560	73%
70	217.4	821,299	8.0	0.66	92.77	52.91	115.62	238.44	245.39	111,543	73%
72	205.1	818,776	8.0	0.66	90.37	49.35	115.41	230.10	245.33	111,515	74%
74	193.5	815,779	7.9	0.66	87.56	45.23	115.16	220.35	245.26	111,483	75%
76	182.6	812,561	7.9	0.66	84.56	40.95	114.90	210.07	245.18	111,448	77%
78	172.3	809,263	7.9	0.66	81.53	36.71	114.62	199.76	245.11	111,412	78%
80	162.5	805,963	7.9	0.66	78.53	32.62	114.34	189.68	245.03	111,375	79%
82	153.3	802,705	7.8	0.66	75.61	28.74	114.07	179.95	244.95	111,340	80%
84	144.7	799,511	7.8	0.66	72.78	25.10	113.80	170.65	244.87	111,304	81%

86	136.5	796,393	7.8	0.66	70.05	21.71	113.54	161.80	244.79	111,270	82%
88	128.8	793,356	7.7	0.66	67.42	18.56	113.28	153.41	244.72	111,236	83%
90	121.5	790,399	7.7	0.66	64.90	15.66	113.03	145.46	244.65	111,203	84%
92	114.6	787,523	7.7	0.66	62.48	13.00	112.78	137.95	244.58	111,171	85%
94	108.1	784,724	7.7	0.66	60.14	10.58	112.54	130.87	244.51	111,139	86%
96	102.0	781,997	7.6	0.66	57.90	8.38	112.31	124.19	244.44	111,108	87%
98	96.3	779,338	7.6	0.66	55.74	6.41	112.08	117.90	244.37	111,078	88%
100	90.8	776,741	7.6	0.66	53.66	4.66	111.86	111.99	244.31	111,049	89%
102	85.7	774,201	7.6	0.66	51.65	3.14	111.64	106.45	244.24	111,020	90%
104	80.8	771,710	7.6	0.66	49.71	1.86	111.42	101.27	244.18	110,992	90%
106	76.3	769,259	7.5	0.66	47.81	0.84	111.21	96.46	244.12	110,963	91%
108	72.0	766,835	7.5	0.66	45.97	0.14	111.00	92.08	244.06	110,936	91%
110	67.9	764,421	7.5	0.66	44.15	0.00	110.79	88.31	244.00	110,908	92%
112	64.1	761,972	7.5	0.66	42.34	0.00	110.58	84.67	243.93	110,879	92%
114	60.4	759,497	7.4	0.66	40.53	0.00	110.36	81.05	243.87	110,851	93%
116	57.0	757,022	7.4	0.66	38.74	0.00	110.15	77.49	243.81	110,822	93%
118	53.8	754,565	7.4	0.66	37.00	0.00	109.93	74.00	243.75	110,793	94%
120	50.8	752,140	7.4	0.66	35.31	0.00	109.72	70.61	243.68	110,765	94%
122	47.9	749,756	7.4	0.66	33.67	0.00	109.51	67.34	243.62	110,737	95%
124	45.2	747,422	7.3	0.66	32.09	0.00	109.30	64.18	243.56	110,710	95%
126	42.6	745,142	7.3	0.66	30.57	0.00	109.10	61.14	243.50	110,683	95%
128	40.2	742,919	7.3	0.66	29.11	0.00	108.90	58.23	243.44	110,656	96%
130	37.9	740,757	7.3	0.66	27.72	0.00	108.71	55.44	243.39	110,631	96%
132	35.8	738,657	7.3	0.66	26.39	0.00	108.52	52.78	243.33	110,606	96%
134	33.8	736,619	7.2	0.66	25.12	0.00	108.34	50.24	243.28	110,582	97%
136	31.9	734,643	7.2	0.66	23.91	0.00	108.16	47.81	243.23	110,558	97%
138	30.1	732,728	7.2	0.66	22.75	0.00	107.99	45.51	243.18	110,535	97%
140	28.4	730,875	7.2	0.66	21.65	0.00	107.83	43.31	243.13	110,513	97%
142	26.8	729,081	7.2	0.66	20.61	0.00	107.66	41.22	243.08	110,491	98%
144	25.2	727,346	7.2	0.66	19.61	0.00	107.51	39.23	243.03	110,470	98%
146	23.8	725,668	7.1	0.66	18.67	0.00	107.36	37.34	242.99	110,450	98%
148	22.5	724,045	7.1	0.66	17.77	0.00	107.21	35.54	242.95	110,430	98%
150	21.2	722,477	7.1	0.66	16.91	0.00	107.07	33.83	242.90	110,411	98%
152	20.0	720,962	7.1	0.66	16.10	0.00	106.93	32.20	242.86	110,393	98%
154	18.9	719,498	7.1	0.66	15.33	0.00	106.80	30.66	242.82	110,375	99%
156	17.8	718,083	7.1	0.66	14.60	0.00	106.67	29.20	242.79	110,358	99%
158	16.8	716,716	7.1	0.66	13.90	0.00	106.55	27.80	242.75	110,341	99%
160	15.8	715,395	7.0	0.66	13.24	0.00	106.43	26.48	242.71	110,325	99%
162	15.0	714,119	7.0	0.66	12.61	0.00	106.31	25.22	242.68	110,309	99%
164	14.1	712,886	7.0	0.66	12.02	0.00	106.20	24.03	242.65	110,294	99%
166	13.3	711,695	7.0	0.66	11.45	0.00	106.09	22.90	242.61	110,279	99%
168	12.6	710,545	7.0	0.66	10.91	0.00	105.98	21.82	242.58	110,265	99%
170	11.8	709,433	7.0	0.66	10.40	0.00	105.88	20.80	242.55	110,251	99%
172	11.2	708,359	7.0	0.66	9.91	0.00	105.78	19.83	242.52	110,238	99%
174	10.5	707,321	7.0	0.66	9.45	0.00	105.69	18.90	242.50	110,225	99%
176	9.9	706,318	7.0	0.66	9.01	0.00	105.60	18.02	242.47	110,213	99%
178	9.4	705,349	7.0	0.66	8.60	0.00	105.51	17.19	242.44	110,201	99%
180	8.9	704,413	6.9	0.66	8.20	0.00	105.42	16.40	242.42	110,189	100%
182	8.4	703,507	6.9	0.66	7.82	0.00	105.34	15.65	242.39	110,178	100%
184	7.9	702,632	6.9	0.66	7.47	0.00	105.26	14.93	242.37	110,167	100%
186	7.4	701,786	6.9	0.66	7.13	0.00	105.18	14.25	242.34	110,156	100%
188	7.0	700,969	6.9	0.66	6.80	0.00	105.10	13.61	242.32	110,146	100%
190	6.6	700,178	6.9	0.66	6.50	0.00	105.03	12.99	242.30	110,136	100%
192	6.2	699,413	6.9	0.66	6.20	0.00	104.96	12.41	242.28	110,127	100%
194	5.9	698,674	6.9	0.66	5.93	0.00	104.89	11.85	242.26	110,117	100%
196	5.6	697,959	6.9	0.66	5.66	0.00	104.82	11.32	242.24	110,108	100%
198	5.2	697,267	6.9	0.66	5.41	0.00	104.76	10.82	242.22	110,100	100%
200	4.9	696,597	6.9	0.66	5.17	0.00	104.70	10.35	242.20	110,091	100%
202	4.7	695,950	6.9	0.66	4.95	0.00	104.64	9.89	242.18	110,083	100%
204	4.4	695,323	6.9	0.66	4.73	0.00	104.58	9.46	242.17	110,075	100%


Sediment Basin #9 Colon Mine Phase 2 Hydrograph
100-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
50
100
150
200
250
300
350
400
450
500
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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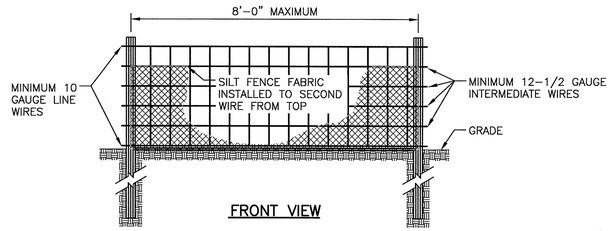
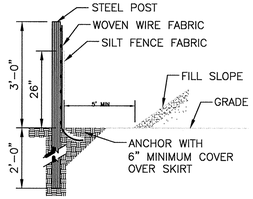


FRONT VIEW

NOTE:

1. USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE AND NEVER IN AREAS OF CONCENTRATED FLOW.
2. SILT FENCE IS TO BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST.
3. INSPECT FREQUENTLY AND REPAIR OR REPLACE PROMPTLY AS NEEDED.
4. REMOVE SEDIMENT DEPOSITED AS NEEDED TO PROVIDE STORAGE VOLUME FOR THE NEXT RAIN AND TO REMOVE PRESSURE ON THE SILT FENCE. UNIFORMLY DISTRIBUTE ON THE SOURCE AREA PRIOR TO TOPSOILING.

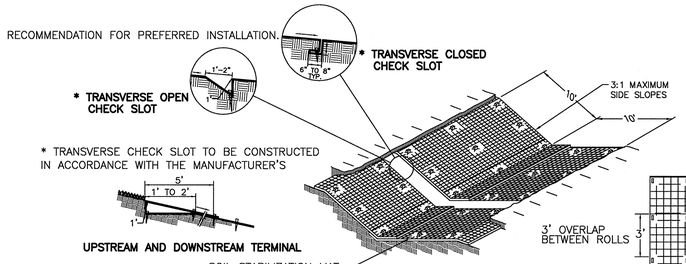


SIDE VIEW

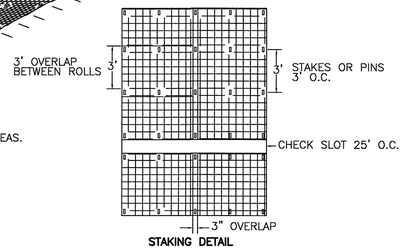
TEMPORARY SILT FENCE DETAIL

NO TO SCALE

1



LINING SHALL EXTEND 10' UP SIDE SLOPES OF LINED AREAS.
LINING SHALL BE CURLEX I OR EQUAL.
SIDE SLOPES SHALL BE A MAXIMUM SLOPE OF 3 TO 1.
LINING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTALLATION PROCEDURES.



STAKING DETAIL

NOTE: STAKES SHALL BE WOOD OR METAL AS RECOMMENDED BY MANUFACTURER AND SHALL BE AT LEAST 12" IN LENGTH.

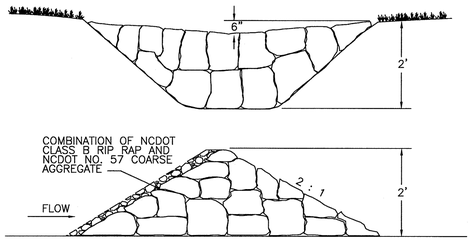
SLOPE INSTALLATION–EROSION CONTROL BLANKET NOTES:

1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" DEEP x 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UP–SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS DOWN OR HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED BY PLACING STAPLES/STAKES IN APPROXIMATE LOCATIONS, SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2"–5" OVERLAP DEPENDING ON BLANKET TYPE. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET EVEN WITH THE COLORED SEAM STITCH ON THE PREVIOUSLY INSTALLED BLANKET.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE BLANKET WIDTH.

TYPICAL SECTION FOR SOIL STABILIZATION MAT LINED AREAS (TYP.)

NTS

2

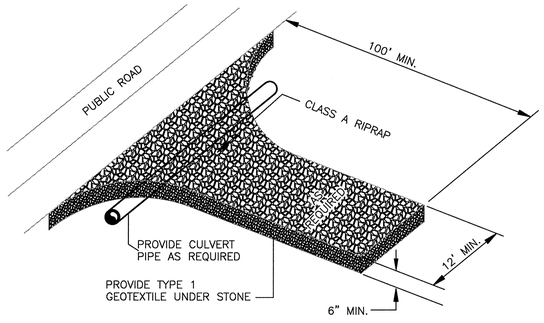


NOTE:
PLACE EVERY 100' ALONG FLOW PATH.

ROCK CHECK DAM

NTS

3



TEMPORARY GRAVEL CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE NCDENR 6.06

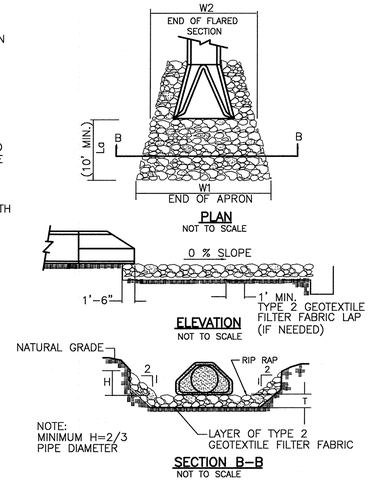
4

NOTES:

1. CLASS OR MEDIAN SIZE OF RIP RAP AND LENGTH, WIDTH AND DEPTH OF APRON TO BE SHOWN ON PLANS.
2. RIP RAP SHOULD EXTEND UP BOTH SIDES OF THE APRON AND AROUNG THE END OF THE PIPE OR CULBVERT AT THE DISCHARGE OUTLET AT A MAXIMUM SLOPE OF 2:1 AND A HEIGHT NOT LESS THAN TWO THIRDS THE PIPE DIAMETER OR CULVERT HEIGHT.
3. THERE SHALL BE NO OVERFLOW FROM THE END OF THE APRON TO THE SURFACE OF THE RECEIVING CHANNEL. THE AREA TO BE PAVED OR RIP RAPPED SHALL BE UNDERCUT SO THAT THE INVERT OF THE APRON SHALL BE THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL. THE APRON SHALL HAVE A CUTOFF OR TOE WALL AT THE DOWNSTREAM END.
4. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
5. ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 95% OR GREATER.
6. THE PLACING OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEVIGING CHANNEL SHALL NOT BE ALLOWED.
7. NO BENDS OR CURVES IN THE HORIZONTAL ALIGNMENT OF THE APRON UNLESS OTHERWISE SHOWN.
8. TYPE 2 GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED ON COMPACTED SUBGRADE PRIOR TO PLACEMENT OF RIP RAP.
9. ANY DISTURBED AREA FROM END OF APRON TO RECEIVING CHANNEL MUST BE STABILIZED.

LOCATION	W1	W2	La	CLASS	T
SB1	12'	4.5'	10'	B	18"
SB2*	12'	6'	10'	B	18"
SB3	9'	3'	8'	B	18"
SB4	9'	3'	8'	B	18"
SB5*	12'	6'	10'	B	18"
SB6	9'	3'	8'	B	18"
SB7*	12'	6'	10'	B	18"
SB8	9'	3'	8'	B	18"
SB9*	26'	11'	22'	B	18"

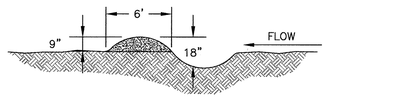
1. SB = SEDIMENT BASIN
2. CLASS = NCDOT CLASS RIP RAP
3. * = FOR EACH BARREL. SEE SEDIMENT BASIN SCHEDULE ON 01C–12.
4. CLASS A RIP RAP MIDRANGE = 4"
5. CLASS B RIP RAP MIDRANGE = 8"
6. CLASS 1 RIP RAP MIDRANGE = 10"
7. CLASS 2 RIP RAP MIDRANGE = 14"



RIPRAP APRON AT PIPE OUTFALLS

NTS

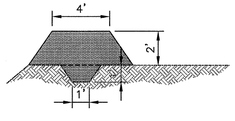
5



DIVERSION SWALE

N.T.S.

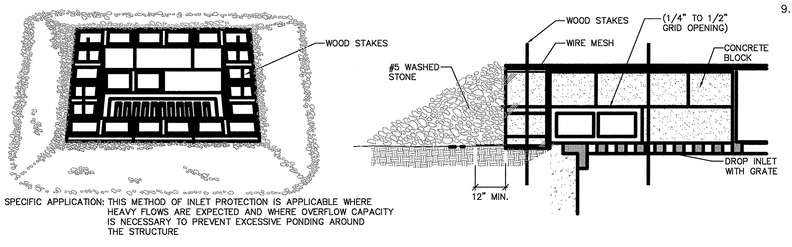
6



DIVERSION DIKE

N.T.S.

8



SPECIFIC APPLICATION: THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE

BLOCK AND GRAVEL STONE INLET SEDIMENT FILTER

NOT TO SCALE

7

C:\pwworking\tpa\d0602580\01C-11.dwg, Plot, 3/6/2015 8:26:55 PM, pwattmor

HDR Engineering, Inc. of the Carolinas

440 S. Church St. Suite 1000
Charlotte, NC 28202-2075
704.338.6700
N.C.B.E.L.S. License Number F-0116

ISSUE	DATE	DESCRIPTION
C	03/2015	REVISED RIPRAP APRON SCHEDULE
B	12/31/14	REVISED PER NCDENR COMMENTS
A	11/2014	ISSUED FOR APPROVAL

PROJECT MANAGER	M.D. PLUMMER, P.E.
DESIGNED BY	R. BAYSDEN, P.E.
DRAWN BY	R. BAYSDEN, P.E.
CHECKED BY	J. READLING, P.E.
PROJECT NUMBER	453925–235691–018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025495 MICHAEL D. PLUMMER

Charah®

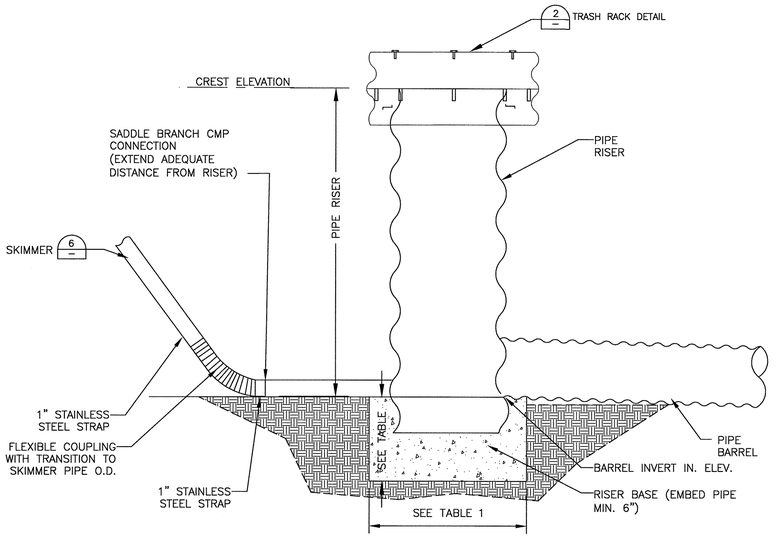
COLON MINE SITE STRUCTURAL FILL
SANFORD, NC

EROSION AND SEDIMENTATION CONTROL DETAILS (1 OF 3)

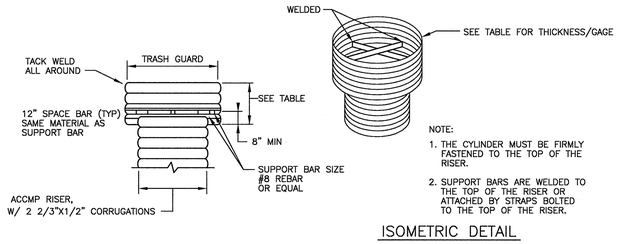
0 1" 2"

FILENAME 01C–11.dwg
SCALE AS SHOWN

SHEET 01C-11

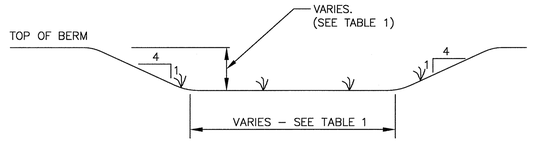


OUTLET STRUCTURE ENLARGEMENT
N.T.S. 1



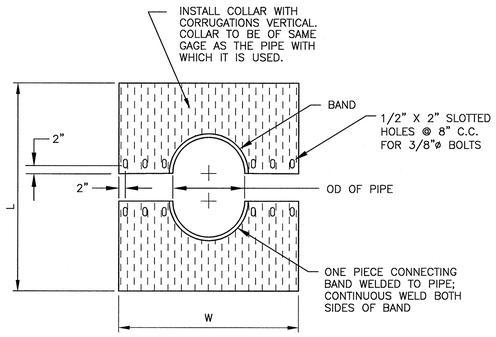
ISOMETRIC DETAIL

TRASH RACK DETAIL
N.T.S. 2

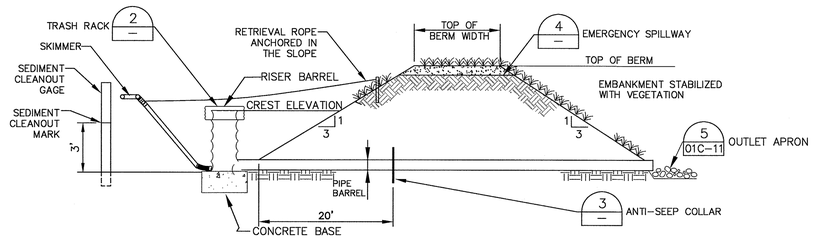


NOTES:
1. EMERGENCY SPILLWAY IS GRASS LINED.

EMERGENCY SPILLWAY TYPICAL
N.T.S. 4



ANTI–SEEP COLLAR DETAIL
N.T.S. 3



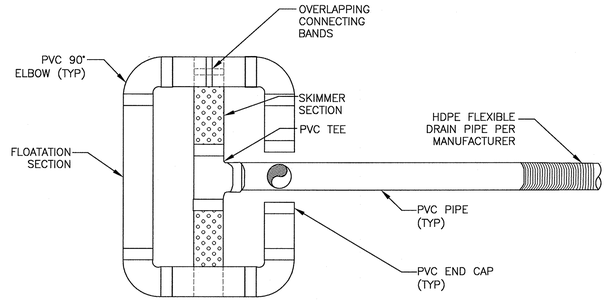
Sediment Basin #	Useful Life (Phase)	Bottom Elevation (MSL)	Top of Berm Elevation (MSL)	Top of Berm Width (FT)	Emergency Spillway Elevation (MSL)	Emergency Spillway Width (FT)	Number of Riser/Barrel /Skimmer Assemblies	Riser Diameter (IN)	Riser Crest Elevation (MSL)	Trash Guard Diameter (IN)	Trash Guard Thickness (Gage)	Trash Guard Height (IN)	Concrete Ballast Dimension s (FT)	Barrel Diameter (IN)	Barrel Invert In (MSL)	Barrel Invert Out (MSL)	Antiseep Collar Size (FT)	Skimmer Size (IN)	Skimmer Orifice (IN)	Dewatering Time (days)
1	1 & 2	283.0	290.5	3	290.0	20	1	54	289.4	78	16	25	6x6x2	18	283.0	282.5	3x3	4	2.7	5
2	1 & 2	259.0	266.0	6	265.0	15	2	60	264.2	90	14	29	6x6x2	24	259.0	258.5	4x4	4	3.1	5
3	1	244.0	250.0	12	249.0	10	1	24	248.4	36	16	13	3x3x1	12	244.0	243.5	2x2	2.5	2	5
4	1	261.0	267.6	12	267.0	20	1	24	266.3	36	16	13	3x3x2	12	261.0	260.5	2x2	4	3.7	5
5	1 & 2	255.0	262.0	12	261.0	20	2	48	260.3	72	16	21	5x5x2	24	255.0	253.8	4x4	6	5.1	5
6	1	249.0	256.0	12	255.1	10	1	18	254.0	27	16	8	2.5x2.5x1	12	249.0	248.5	2x2	5	4	5
7	1 & 2	238.0	245.5	12	244.9	20	2	60	244.4	90	14	29	6x6x2.5	24	238.0	237.5	4x4	4	3.5	5
8	1	273.0	279.0	12	278.3	10	1	18	277.5	27	16	8	2.5x2.5x1	12	273.0	272.0	2x2	4	3.2	5
9	1 & 2	262.0	270.5	3	269.5	50	2	72	268.7	102	14	36	7x7x3	42	262.0	260.8	7x7	5	4.6	5

NOTES:
1. MSL = MEAN SEA LEVEL
2. ALL PIPES ARE ASPHALT COATED 16GA OR HEAVIER EXCEPT FOR SKIMMER

SEDIMENT BASIN SCHEDULE DETAIL
N.T.S. 5

MAINTENANCE AND INSPECTION

1. INSPECT SEDIMENT BASINS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY.
2. REMOVE SEDIMENT AND RESTORE THE BASIN TO ITS ORIGINAL DIMENSIONS WHEN IT ACCUMULATES TO ONE–HALF THE DESIGN DEPTH. PLACED REMOVED SEDIMENT IN AN AREA WITH SEDIMENT CONTROLS
3. CHECK EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE, AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. MAKE ALL NECESSARY REPAIRS IMMEDIATELY. REMOVE ALL TRASH AND OTHER DEBRIS FROM THE RISER AND POOL AREA.
4. ALL CMP SHALL BE FULLY ASPHALT COATED, 16 GA. OR HEAVIER
5. POND DIMENSIONS SHOWN ARE FOR THE CONTROLLING PHASE.



NOTES:
1. ALL PVC PIPES ARE TO BE SCHEDULE 40 UNLESS OTHERWISE NOTED.
2. ALL JOINTS OF THE FLOATATION SECTION SHALL BE SOLVENT WELDED. JOINTS OF SKIMMER SECTION NEED NOT BE WATER–TIGHT.
3. HDPE FLEXIBLE DRAIN PIPE IS TO BE ATTACHED TO THE PIPE BARREL STRUCTURE WITH WATER–TIGHT CONNECTIONS.
4. SEE SCHEDULE FOR ORIFICE SIZE.
5. FAIRCLOTH TYPE OR EQUIVALENT SKIMMER TO BE USED.

FAIRCLOTH SKIMMER DETAIL
N.T.S. 6

HDR Engineering, Inc.
of the Carolinas

440 S. Church St. Suite 1000
Charlotte, NC 28202-2075
704.338.6700
N.C.B.E.L.S. License Number F-0116

ISSUE	DATE	DESCRIPTION
C	03/2015	REVISED SEDIMENT BASIN SCHEDULE
B	12/31/14	REVISED PER NCDENR COMMENTS
A	11/2014	ISSUED FOR APPROVAL

PROJECT MANAGER	M.D. PLUMMER, P.E.
DESIGNED BY	R. BAYSDEN, P.E.
DRAWN BY	R. BAYSDEN, P.E.
CHECKED BY	J. READLING, P.E.
PROJECT NUMBER	453925–235691–018

NORTH CAROLINA PROFESSIONAL SEAL 025495 ENGINEER MICHAEL D. PLUMMER 9/4/15

Charah®

COLON MINE SITE STRUCTURAL FILL
SANFORD, NC

EROSION AND SEDIMENTATION CONTROL DETAILS (2 OF 3)

0 1" 2"

FILENAME 01C–12.dwg
SCALE AS SHOWN

SHEET 01C-12

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